IMPROVE YOUR FLYING ON YOUR HOME PC—*REALFLIGHT G2*
page 42

MODEL Airplane NEWS

ENGINE BREAK-IN
MORE POWER LONGER LIFE
page 98

CHECK OUT THE WORLD'S LARGEST SCALE MODELS

5 GREAT MODELS REVIEWED
- **Little CAP 232**—60-inch aerobat
- **Fairchild**—military trainer
- **Corsair**—WW II fighter
- **Tracer**—.46-size pattern ship
- **Impress**—electric park flyer

NEW MAGAZINE!

FLY AT HOME!
SEE PAGE 131

HOW TO BUILD STRONGER WINGS

NOVEMBER 2001

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MODEL Airplane NEWS

NOVEMBER 2001 • VOLUME 129, NUMBER 11

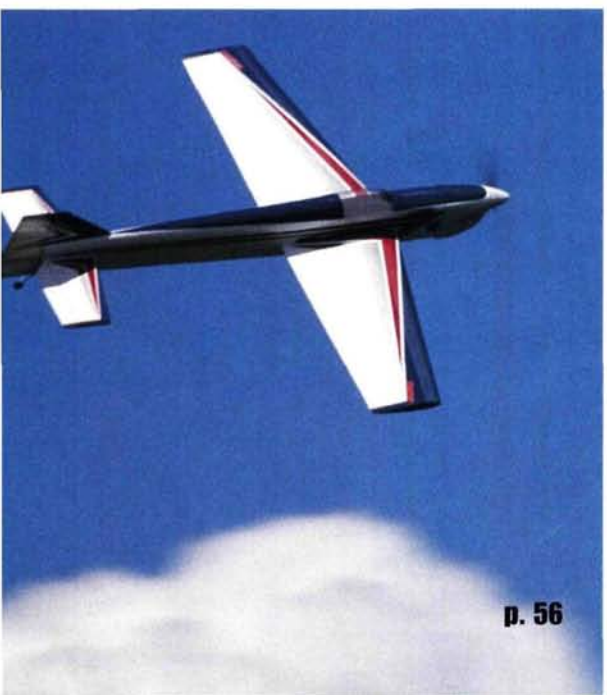
ON THE COVER: *main image—caught during a low flyby at the La Ferté Giant-Scale event, this B-17 is the work of Richard Rawl. The 1/6-scale Flying Fortress is powered by four Titan 45cc engines and has a 212-inch span. Inset—powered by four ZDZ 160cc engines, this Constellation was one of the most impressive models at La Ferté.*

Features

Columns

Construction

Field & Bench Reviews



Departments

EDITORIAL

BY DEBRA SHARP

Backyard Flyer *magazine!*

It's the height of the flying season here in Connecticut, and we've been taking full advantage of the baseball field across the street from our office by flying more than a dozen park flyers. Although we had a great time at our convenient flying field, our objective was more than "fun and sun": we were testing and photographing models for our new

quarterly magazine, *Backyard Flyer*, which will be available on newsstands October 9. After launching Chris Chianelli's new column earlier this year, we realized that the tremendous development of and interest in park and backyard RC warranted a standalone magazine. Although we'll continue to offer information on and reviews of these small models and their gear in *Model Airplane News*, we're excited to introduce a publication dedicated solely to this up-and-coming aspect of the hobby. In his column this month, Chris gives you a sneak peek at the models we'll feature in the inaugural issue of *Backyard Flyer*.

When the world's largest model planes gathered at a fly-in in La Ferté Alais, France, photojournalist Dick van Mourik captured the action on film. With wingspans of more than 15 feet, these giant masterpieces look as though they're ready for their pilots to step aboard. Turn to page 30 to check out giant-scale modeling, European-style.

A thorough break-in may be the single most important process you can complete to ensure your engine's peak performance and longevity. In his "Real Performance Measurement" column this month, Dave Gierke reveals the precise steps for proper break-in. Turn to page 98 to see how a few hours of preflight conditioning can result in years of reliability at the flying field.

Our construction article this month concerns an unusual and historically significant airplane that's sure to turn heads at the flying field. Alan Heim's design of the twin-engine Remington-Burnelli RB-2 features a lift-generating fuselage and employs traditional balsa and ply construction techniques.

Looking for a way to hone your piloting skills? Great Planes' *RealFlight Generation 2* flight simulator boasts some of the most realistic graphics we've seen yet. Contributor Rick Bell tells you just how well this program performs on page 42.

Send us your comments and tell us what you'd like to see more of in *Model Airplane News* by emailing man@airage.com or writing to us at 100 East Ridge, Ridgefield, CT 06877-4606 USA. ✈

MODEL Airplane NEWS
FOUNDED 1929

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Member Audit Bureau of Circulations
MPA Magazine Publishers of America

PRINTED IN THE USA

AIRWAVES

Our readers write back

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA; man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous number of letters we receive, we cannot respond to every one.

READY FOR BATTLE

Nice article in the September 2001 issue about the ARF warbirds. Any idea, though, how durable those planes are? How long do they hold up under normal wear and tear? Do they benefit from parts' reinforcement, or is that just added weight? [email]

TODD ROBINSON

Great question, Todd, and the answer is that some of our reviewers are still flying the warbird ARFs they built a few years ago! The high-quality construction of today's ARFs ensures that they'll last as long as any kit-built airplane. As for adding reinforcements, I just don't think it's necessary. Remember, these models are designed to fly well, and any additional reinforcement will only add weight and affect their flight performance. Anyway, no amount of reinforcing will make a model "crash-proof"; as long as it's flown properly, your model should withstand years of normal field duty. GY

FLIES LIKE A CHAMP

I recently built and flew the Aeronca Champ designed by Nick Ziroli Sr. that was featured in the November 2000 issue of *Model Airplane News*. It flew great, except for the wing; I thought I could save a few grams by omitting the wing struts, but I didn't realize that this would cause the wing center section to break! After I had rebuilt the front end and the wing, the new wing braces worked great. Thanks to Nick for giving us such a great airplane. [email]

DANNY KWONG

LOOKING FOR ERIKA

I am looking for the pilot busts you referred to and used in your review of the Hangar 9 PT-19 a while back. The only thing I can find is "Bridgette" (the blonde) through Hobby Lobby, but I cannot locate "Erika" (the redhead) anywhere! I am building a Dynaflite PT-19 kit with the same engine as you used in your Hangar 9—the Saito 1.50—and thought it would be a great idea to use the same pilot figures.

Please help. I am not too adept at computer searches, and all my efforts at the local hobby shops have been futile. [email]

JEFF KEEFER

The answer is ... they're the same pilot figure (two Bridgettes!). One of them "became" Erika when I painted her hair red. Get two blondes and some red paint, and you're there, Jeff! Have fun. CC

STRONGER MOLDED PARTS

I just read Dan Santich's article in the September 2001 issue on making your own fiberglass parts. Admittedly, I am a rookie at this; I have tried it before with dreadful results. I made the Styrofoam plug as suggested in the article (the part being made was the ring for a dummy radial engine), but adding multiple coats of resin gave less than satisfactory results. When I removed the part from the plug, I found that it was very pliable and quite flimsy. I used an epoxy resin with heavy fiberglass cloth. If you have any suggestions about how to produce a more rigid result, similar to the molded pieces you see in kits, I would be very grateful. You have an outstanding magazine; the tips are very useful. Keep up the good work. [email]

MARK SCOTT

Mark, multiple coats of resin alone add only weight, not strength. A structure's strength comes from several layers of fiberglass cloth laminated with just enough resin to saturate them. Furthermore, not all fiberglass cloth is created equal. For expert advice on which fiberglass cloth to use for your application, give our friends at Aerospace Composite Products a call at (510) 352-2022, or check out www.acpsales.com. Good luck with your next project. GY

TOP GUN CHOPPERS

I really enjoyed seeing the scale helicopters in your "Top Gun" coverage, and I noticed that you featured one in the "Reader's Gallery" last month. That Dauphin is an incredible example of scale craftsmanship. I'd really like to see these competition helis; have you heard where and when Top Gun 2002 will take place? [email]

MIKE HAYES

Mike, we also think that adding helicopters to Top Gun was a great idea of promoter Frank Tiano's. We recently heard that Top Gun 2002 will take place at Lakeland Linder Airport in Lakeland, FL, April 23 to 28, and helicopter flight judging will be included. This new location is less than an hour's drive from Walt Disney World in Orlando and Busch Gardens in Tampa, so there are plenty of hotels and activities for the whole family. For more information, check out www.franktiano.com or call (561) 795-6600. Hope to see you there! DS

AIR SCOOP

BY CHRIS CHIANELLI

New products or people behind the scenes: my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

Global Hobby

New Product Line

The folks at Global obviously had the experienced modeler in mind when they created the new no-fuss, no-muss Sportsman Aviation line of high-quality ARF planes. With the Sportsman line, Global gives you just what you need and nothing else—just the way I like it!

Global will officially launch the line this fall with the release of a .30-size WACO ARF and a 1/2-scale Me-109 that will be offered in both ARF and ARC form. The WACO needs a Magnum .30 4-stroke engine will have a 40-inch wingspan and will sell for $160. The Me-109 will have a 35-inch wingspan, will run on a Magnum .15 to .25 engine and sell for $99.99 (ARF) and $84.99 (ARC).

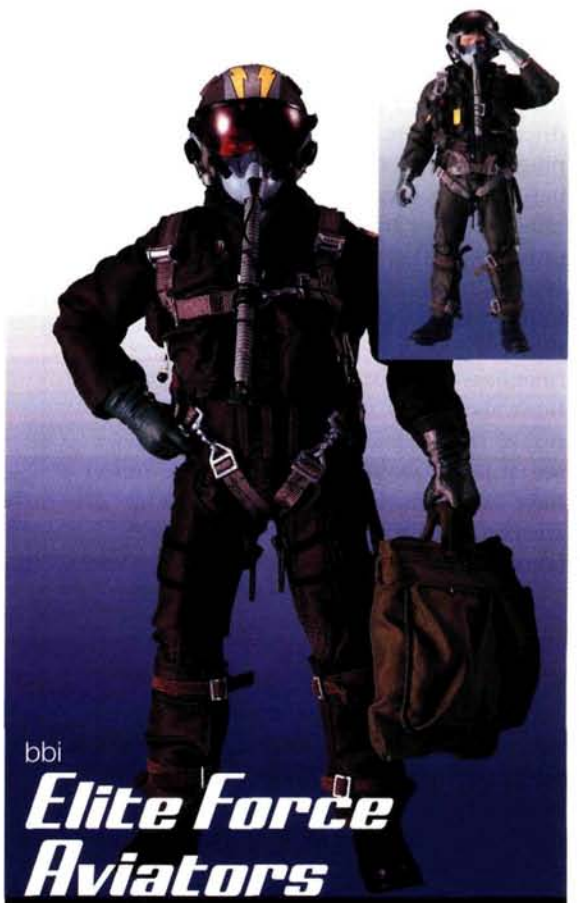
Global Hobby Distributors, 18480 Bandilier Cir., Fountain Valley, CA 92708; (714) 963-0133; fax (714) 962-6452; www.globalhobby.com.

Top Flite

Gold Edition RC Nobler

Top Flite's new and improved Nobler is proof positive that good things stand the test of time. In celebration of the 30th anniversary of this classic sport model, Top Flite is proud to introduce the lighter, stronger and easier-to-build Gold Edition RC Nobler. The kit features precisely die-cut parts that ease assembly, and the I-beam, D-tube wing construction provides strength. The included, adjustable engine mount accepts any .25 to .50 2-stroke or .40 to .52 4-stroke engine. The Nobler has a 51-inch wingspan, weighs between 3.5 and 5 pounds and is 42.4 inches long. It's affordably priced at $149.99.

Top Flite; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826; (800) 682-8948; fax (217) 398-0008; www.topflite.com.



bbi

Elite Force Aviators

How cool would these new scale pilot figures look in the cockpit of your newest fighter? The F-18 Hornet Naval Pilot and F-15 Eagle Pilot are authentic 1/6-scale figures with faithfully reproduced flight suits, survival equipment, flight helmets and oxygen masks. Each figure comes with a bonus display stand, and the first 3,000 of each figure produced will include an embroidered Elite Force aviator patch. Get yours now for only $49.99.

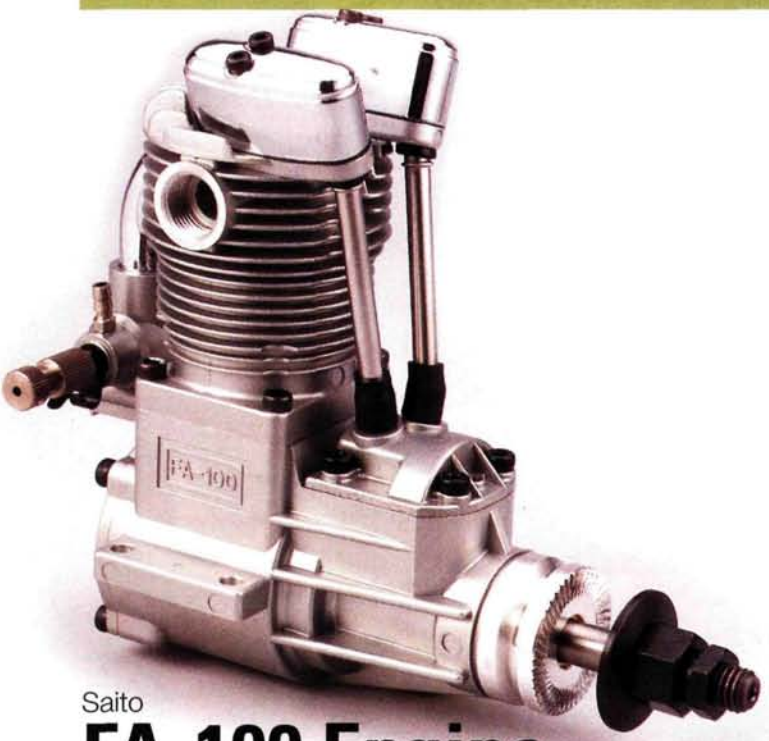
bbi; a division of Blue Box Toys, 200 5th Ave., New York, NY 10010; (212) 255-8388; fax (212) 255-8520; www.blueboxtoys.com.

Robart

MIGHTY MINI RETRACTS

The new 530 series Mighty Mini retracts from Robart rank among the very best in small-gear technology. This ultra-low-profile unit is only 1 inch high and weighs just 2.8 ounces. With seven standard main-gear angles and five for the nose gear, there are 176 combinations of strut and retract angles. Because they are made of heat-treated steel and aluminum components, the Mighty Minis are rated for an 18-pound model and are strong enough to use Robart series 380 or 440 struts. Robart's high-quality, ½-inch-bore air cylinders provide 20 pounds of force at 100psi. For prices and availability, check out Robart's website at www.robart.com.

Robart, 625 N. 12th St., P.O. Box 1247, St. Charles, IL 60174; (630) 584-7616; fax (630) 584-3712; www.robart.com.



Saito

FA-100 Engine

Saito's FA-91 was the most popular 4-stroke engine—until now! You asked for more power, and Saito delivered. The FA-100 will turn an APC 14x8 prop at 300 to 700rpm more than the .91, but at only 19.2 ounces, the FA-100 remains similar to the .91 in size and weight. The FA-100 is more than just a power-packed .91; it features a newly tooled case that allows it to be used with the many aftermarket engine mounts already available to fit engines of similar sizes. If you're looking for a powerful, lightweight 4-stroke to run your latest .60 through .90-size plane, you no longer have to settle on a .91. You can have the new Saito FA-100 for only $279.99.

Saito; distributed by Horizon Hobby, 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.

Giantscaleplanes.com

Boeing P-26 Peashooter

With the introduction of the Boeing P-26 Peashooter, Giantscaleplanes.com continues to improve on its already terrific line of almost-ready-to-fly (ARF) scale planes. The kit includes a fiberglass fuselage and cowl and a full set of color decals. The wings are constructed of sheeted foam and covered with film, as are the stab and control surfaces. All of the Peashooter's control surfaces have beveled leading edges, and the control-horn mounts come already installed. The P-26 has a 71-inch wingspan, is 51 inches long and runs on a .60 2-stroke or .91 to 1.20 4-stroke engine. It's priced at $279.99.

Giantscaleplanes.com, 201 3rd St. & Rt. 309 N., Coopersburg, PA 18036; (610) 282-4811; fax (610) 282-4816; www.giantscaleplanes.com.

Spin Master

E-Chargers Intruder

Sometimes it's interesting to try out a new RTF model just to keep tabs on advancing technology. The E-Chargers Intruder from Spin Master has a lightweight and durable, all-foam body with a compact planform. According to the manufacturer, the Intruder has automated features that may be recommended for first-time park flyers. These include an auto-takeoff system that manages the controls during the first few seconds of flight to ensure that the model gets in the air, an emergency land button that will bring the model down for a gentle, auto-controlled landing, and a thrust button that sends extra power to the propellers for a burst of speed. The $59.99 airplane is said to produce 3-minute flight times powered by two motors running on 6-cell batteries.

Spin Master Toys, 450 Front St. W., Toronto, Ontario, Canada M5V 1B6; (800) 622-8339; www.spinmaster.com.

Pacer Technology

Fiber-Poxy

When it comes to model adhesives, Pacer Technology, the folks who brought you Zap, can always be counted on for something new. Fiber-Poxy, designed specifically for bonding fiberglass, sets in 3 to 4 minutes and is ready to handle in 15. When dry, it is flexible and waterproof, and it fills gaps nicely. It's ideal for both epoxy and polyester fiberglass, as well as metal, glass, concrete and ceramics—in case you have a few non-hobby projects lying around. A 1-ounce tube with dispenser retails for $4.99.

And if you're looking for information about Zap products, you can now find it on the Web. View complete product descriptions and helpful "how-to" tips, or enter a contest to win free Zap products by sharing your Zap experiences at www.zapglue.com.

Pacer Technology, 9420 Santa Anita Ave., Rancho Cucamonga, CA 91730; (909) 987-0550; (800) 538-3091; www.pacertech.com.

Fuji

New Engines for U.S. Market

At last, American modeling enthusiasts have an opportunity to enjoy the Fuji engines that the Japanese have relied on for years. Fuji engines are not simply converted "lawn trimmer" engines; they're made specifically for model airplane use. Fuji's automatic timing mechanism ensures more powerful, top-end rpm and easier starting. Fuji custom-designs each engine mount to match the size and application of the powerplant, so installation is a breeze. Thanks to a dynamically balanced flywheel, prop hub and crankshaft, Fuji engines boast very smooth, low-vibration performance—even at idle. Each engine has a regulating pumper carb to optimize fuel flow for dependable performance regardless of attitude. Fuji engines come in three sizes: .32—$499.99.; .50—$549.99. and an .86 twin—$1,199.99.

Fuji; distributed in the USA by Great Planes, P.O. Box 9021, Champaign, IL 61826; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.

CSM

Combat System

If you spend most of your time at the flying field engaging in aerial battles, have we got a system for you. The AIR Wars Combat System fires coded infrared bullets that are recorded by an infrared light sensor mounted on the tail of the target plane. Though it's designed primarily for slope or small electric planes, the Combat System can also be mounted on glow-powered planes by lengthening the leads. Also available is a separate PC interface system that can store the names of up to 30 pilots and can record statistics for each. The AIR Wars Combat System sells for $69.99, and the PC interface is priced at $22.99.

CSM; distributed by Horizon Hobby, 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.

Hitec RCD

Two New Radio Systems

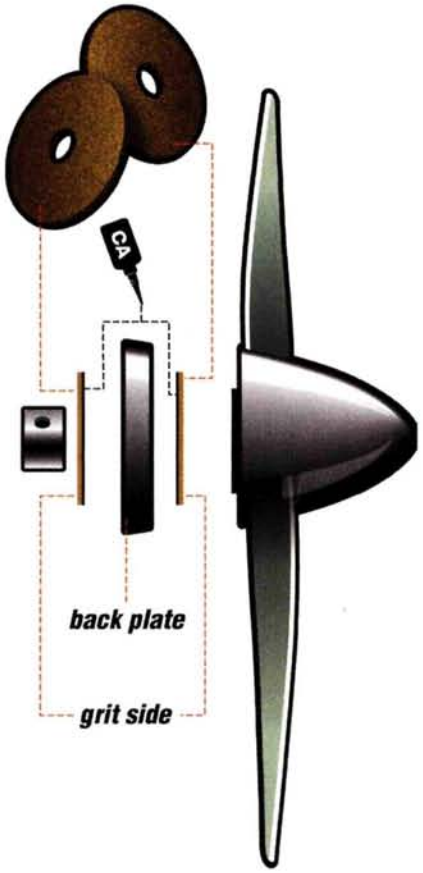
Here's some great news for anyone who's looking for a new radio system. The folks at Hitec just introduced the all-new Laser 4- and 6-channel, FM systems. Each is loaded with great features such as built-in elevon and vee-tail mixing, and the Laser 6 has aileron and elevator dual rates. Both have all-channel servo-reversing and include a Supreme 8-channel receiver, 600mA transmitter Ni-Cds, a 600mA receiver battery and an AC overnight wall charger. The Laser 4 comes with four HS-300 servos and costs $219.95; the Laser 6 includes four HS-422 servos and is priced at $269.95.

Hitec RCD Inc., 12115 Paine St., Poway, CA 92064; (858) 748-6948; www.hitecrcd.com.

READERS'
TIPS & TRICKS

ILLUSTRATIONS BY DAVID BAKER

SEND IN YOUR IDEAS. *Model Airplane News* will give a free, one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Readers' Tips & Tricks." Send a rough sketch to *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



NO-SLIP PROP

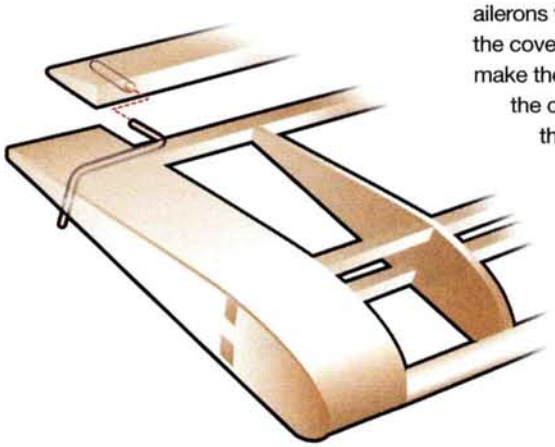
Modelers often have to contend with prop slippage; the spinner backplate can slip against the engine thrust washer or the prop itself. To prevent this, make two small discs from 150-grit sandpaper. Glue the smooth sides of each disc to the spinner backplate—one in front and one in back. To make sure the discs hold securely, use thin CA with a light dusting of baking soda.

Herman Grooters, Hudsonville, MI

COLOR-CODED LANDINGS

If you have a difficult time spotting your plane during head-on landing approaches because of buildings or trees in the background, apply a thin strip of brightly colored MonoKote to the leading edges of the wings. White, yellow, or any Day-Glo color will help you bring your model in safely every time.

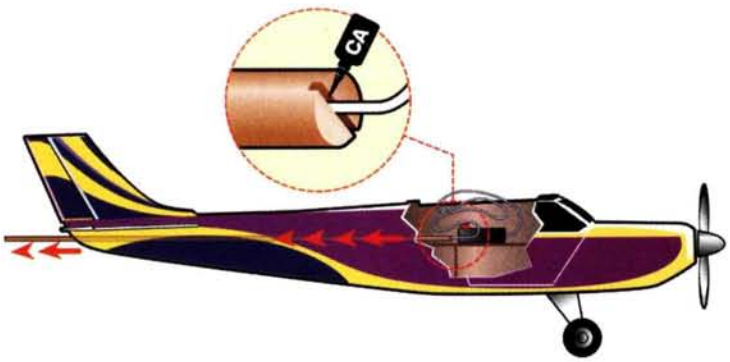
Joseph Kazakavage, Sebastian, FL



DETACHING AILERONS

Occasionally, you may need to remove the ailerons from your model's wings to mend the covering or perform some other repair. To make the task easier, insert a brass tube of the correct diameter into the hole where the aileron torque rod seats. Be certain that the fit between the tube and the torque rod is snug but not too tight. Secure the tube in the aileron with a drop of CA, and then press-fit the torque rod into the tube.

Jaap Hanepen, Auckland, New Zealand



EASY ANTENNA INSTALL

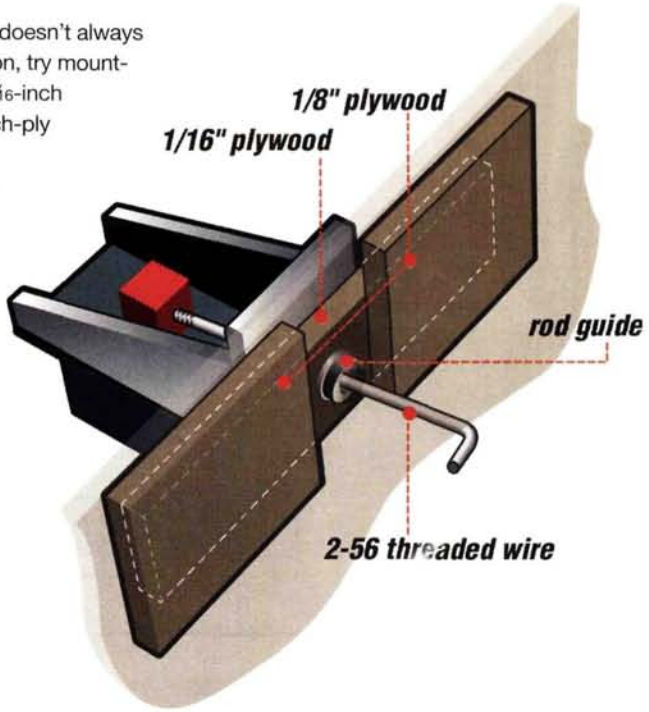
Here's an easy technique for stringing an antenna wire through your model's fuselage. Drill a 3⁄32-inch hole in the fuselage where the antenna will exit, making sure the hole is parallel to the length of the fuselage. Use a cut-off disc in a rotary tool to cut a slot in the end of a piece of 3⁄32-inch music wire that is long enough to reach from the hole to the receiver inside the fuselage, plus a few inches to hold onto. Slide the wire through the hole and up to the receiver location. Use a drop of CA to hold the end of the antenna in the slot on the tip of the music wire. When the CA has set, draw the wire with the antenna back through the fuselage and out the hole, then remove the antenna from the slot.

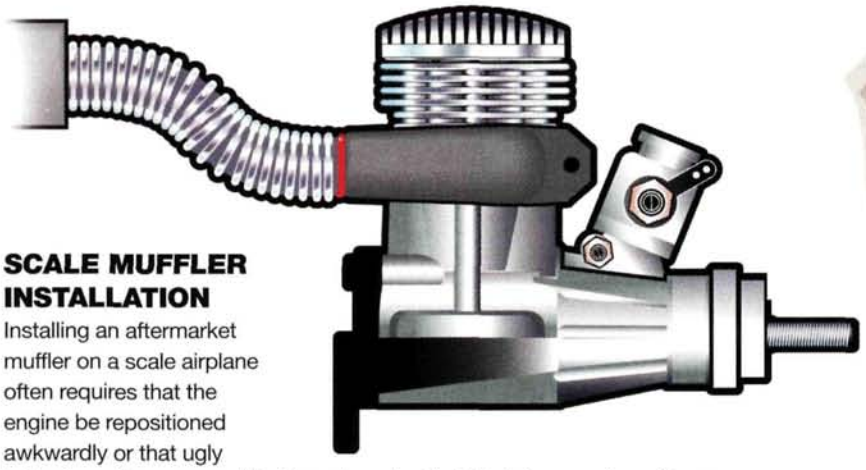
George Kyer, Carnation, WA

HIDDEN SWITCH

An easy-to-reach radio switch is a worthwhile convenience for any model, but it doesn't always look great sticking out of the side of your fuselage. For a less obtrusive installation, try mounting your Du-Bro radio switch inside your fuselage on a plywood bracket. Drill a 3⁄16-inch hole in a 1⁄16-inch-thick piece of plywood for the Du-Bro rod guide. Glue an 1⁄8-inch-ply block on either side of the rod guide. Cut a piece of 2-56 threaded wire to the appropriate length for your installation, and drill a hole in your fuselage just large enough for the wire. Slip the wire into the hole in the fuselage, through the rod guide and into the switch cap. Align everything so the switch moves easily with the wire, then glue the 1⁄8-inch blocks to the inside of the fuselage to hold the assembly in place.

Steve Aldridge, Boise, ID

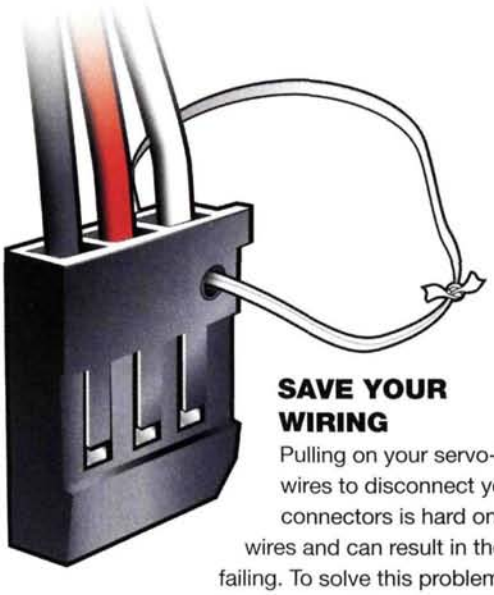




SCALE MUFFLER INSTALLATION

Installing an aftermarket muffler on a scale airplane often requires that the engine be repositioned awkwardly or that ugly holes be cut in your cowl for the exhaust outlet. High-temperature silicone exhaust tubing is often of the wrong size, and it is heavy. Instead, try using flexible stainless-steel gas tube and some RTV high-temp silicone sealant. Bend the tube to shape, cut off any excess, and apply sealant to the ends. Tighten one end of the tube into the header and the other into the muffler. Make sure the tube crimps slightly so it is well sealed to the exhaust outlet and doesn't vibrate loose. Note that you can also use this material to make an exhaust pipe exit downstream of the muffler outlet.

Richard LaPorte, Skowhegan, ME



SAVE YOUR WIRING

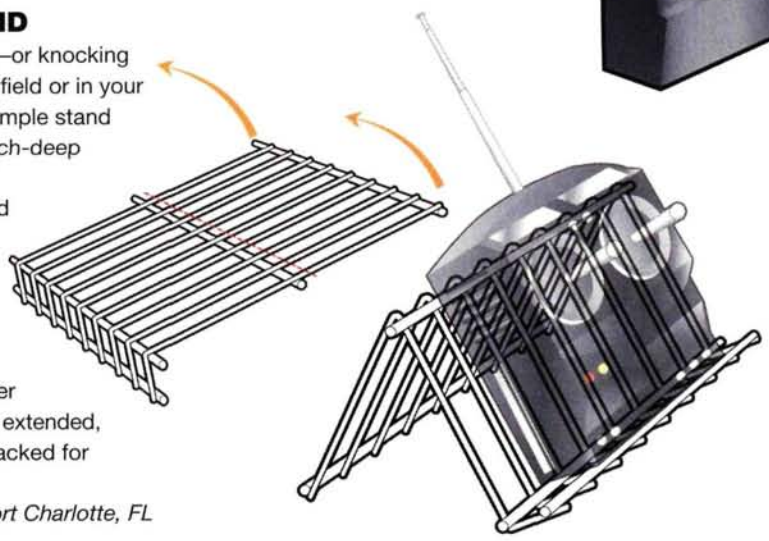
Pulling on your servo-lead wires to disconnect your connectors is hard on the wires and can result in their failing. To solve this problem, take a pin and heat it until it is hot enough to melt plastic. Push the pin through the plastic on the edge of the connector (away from the wires) so it makes a small hole all the way through. Thread a piece of dental floss through the hole and tie it in a loop large enough to fit your finger. When you need to pull your connectors apart, pull on the loop instead of the wires.

Jack Harvey, Chattanooga, TN

TRANSMITTER STAND

If you're tired of stepping on—or knocking over—your transmitter at the field or in your workshop, make yourself a simple stand like this one. Buy some 12-inch-deep wire shelving from your local home-improvement store, and cut it to match the width of your transmitter; then bend the shelving in the middle to about a 45-degree angle. This stand will easily hold your transmitter upright even with the antenna extended, and several stands can be stacked for easy transportation.

Robert Svetovich, Port Charlotte, FL



PILOT PROJECTS

A look at what our readers are doing

SEND IN YOUR SNAPSHOTS. ***Model Airplane News*** **is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable but please do not send digital printouts. We receive so many photographs that we are unable to return them.**

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to "Pilot Projects," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

CLASS ACT

This photo comes to us from the aerospace students at Walton (NY) High School. As part of their course work, the students learned to build and fly an RC plane. The result of their "A+" effort is this beautiful Tower Trainer .40, which has made more than 25 flights this year alone. According to their teacher, Mark Lamoreaux, the Trainer is powered by an O.S. .40 LA and controlled by a Tower Hobbies 4-channel radio. Next year, Mark's students will build a J-3 Cub; we sure would love to see the results.

AXIS ACE

The old saying that "If it looks good, it will fly good" might have originated with the Focke-Wulf 190D-9. Jeffrey Pogar of East Patchogue, NY, built this example from a Pica kit. It has a 63½-inch wingspan and is powered by a SuperTigre .75 engine. Jeffrey installed Spring Air retracts, split flaps and Robart wheels to dress up his model, and he finished it with Nelson System 3 paints. For extra realism, he added panel lines with metal tape, a Pica aluminum spinner and cockpit and a Top Flite pilot.

EYE CANDY

This photo of a Radio Craft Staudacher S-300 comes to us from Ed Wherel of Eighty Four, PA. Ed's model weighs 28 pounds with a BME 102 twin engine. The unique "LifeSaver" graphics are courtesy of Charlies Flying Circus. According to Ed, his Staudacher is a "sweet" flyer. Well, Ed, it's certainly sweet to look at!

MODIFIED MOTH

John Bartanowitz of Auburn, WA, built this ¼-scale deHavilland Tiger Moth from an OK Models kit that he found at a swap meet. John is thankful that the plan was very good because by the time the kit reached his hands, all but one page of the instructions were gone. The model weighs 12 pounds, 11 ounces with an 88-inch wingspan. It runs on a Saito .91S 4-stroke engine and is covered in Goldberg Color Tex Cub yellow. John says he has made many modifications to give his plane a true scale appearance and that it flies superbly.

FLYING RAZOR

It took Bud Trapp of Sycamore, IL, 9 months to complete this JB Models ⅓-scale Fokker D-VIII, but it looks as if it was well worth the wait. Bud's model weighs 38 pounds and has a 10-foot wingspan. It's powered by a Zenoah G-62 with electronic ignition and is covered with 21st Century's dark red fabric. This Fokker D-VIII also features a smoke system for dogfighting—a nice touch!

TIGGER-IFIC

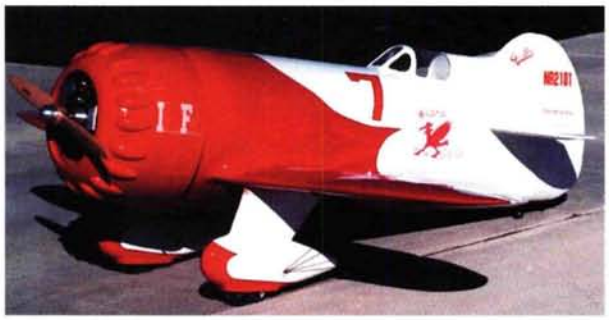
Dwight Massey of Bon Accord, Alberta, Canada, wanted to build a plane that would really stand out on the flightline, and boy, did he succeed. He covered his Lanier Stinger with 21st Century orange and lemon-yellow fabric and used Tremclad glossy black and rust-colored paint for the stripes. This giant-scale "Tigger" has an 84-inch wingspan and weighs in at 27 pounds. It's powered by a Zenoah G-62 engine turning an APC 20x12 prop and is controlled by a Futaba T6-XA radio. Dwight painted the cowl with 21st Century Circus Pink to match Tigger's nose. The resemblance is uncanny!

SKY'S THE LIMIT

William Pompilii of Warminster, PA, scratch-built this Skyfarer from a *Model Airplane News* plan. A Magnum XL-52 RFS 4-stroke engine powers William's model, and it's guided by a Futaba T6 XA transmitter with Futaba servos. William covered his Skyfarer with Coverite fabric and the result, as you can see, is terrific.

PERFECT PETE

Gene LaFond of Wenatchee, WA, sent us this photo of his Howard DGA 3 Pete that he scratch-built from a John Anderson plan. Gene's Pete is a ⅓-scale model of the 1930 racer designed by Benny Howard. The model has an 81-inch wingspan and is powered by an O.S. 120 Surpass 4-stroke engine. According to Gene, his Pete produces smooth, realistic flight.



TALENTED TEEN

Seth Davis of Bellevue, WA, sent us this photo of his Great Planes Super Skybolt biplane. Believe it or not, the Skybolt is Seth's second kit project—and he's only 14 years old! Who says experience comes only with age? Seth powered his plane with an O.S. .91 FX and covered it with four rolls of MonoKote. According to Seth, the Skybolt flies great and can perform "the best flat spins you have ever seen."

GIANT GEE BEE

George Wardleigh of Ogden, UT, sent us this photo of his ⅓-scale Gee Bee R1/R2, which he scratch-built with the help of drawings from 3-views. George installed a Quadra 100 twin engine to power his plane and uses a Futaba 148 FM radio for control. According to George, his Gee Bee is extremely aerobatic but flies as smoothly and as stably as a Piper Cub.

Left to right: powered by four ZDZ 160cc engines, this Connie was very impressive in size and performance. ■ This very big Sean D. Tucker Challenge was built by Stefan Wurm. ■ A lineup of some of the outstanding models at the meet. ■ Belgian Team Vercruysse brought along its massive B-29. The model currently holds the record as "the world's largest model airplane."

A European gathering of scale giants

La Ferté Alais

Two Sopwith Pups taking off in formation; built from an enlarged Practical Scale plan, they were very impressive in flight.

by Dick van Mourik

For many years, large- and giant-scale model aircraft were built and flown only outside of Europe. A few courageous European modelers attempted this type of modeling, but most hobbyists on the Continent thought anything exceeding an 80-inch wingspan was too big to be practical.

This 1/2-scale Fokker Dr.I built by Leo Schmidt, is rolled to the start. The triplane is powered by a 280cc ultralight engine.

Jean Zimmermann shows off his Kawasaki Ki-132. The 120-inch model is powered by a Titan 45cc engine.

Thankfully, some progressive French modelers decided 20 years ago to organize a meet for anyone who was seriously interested in *very* large-scale modeling. Nowadays, this preeminent event attracts modelers from all over Europe and is considered "the place to be" when it comes to large-scale modeling.

Here, a 1/3-scale, 164-inch Gilmore Red Lion built by Pascal Madier is being prepared for takeoff.

PHOTOS BY DICK VAN MOURIK & SJOERD HIEMSTRA

Steve Holland displayed his DH-88 "Comet" in a very scale-like manner. This model is sure to attract everybody's attention whenever it's flown. The full-size plane was victorious in the 1932 Melbourne race.

Jean Jegou's impressive MS 230 in flight; for many, this was "the" model of the meet.

Organized by the local modeling club in association with the International Miniature Aircraft Association (IMAA), this meeting is held at the Aerodrome of Cerny, in the village of La Ferté Alais, about 30 miles south of Paris. Once a year, the field is closed to full-size activities, and all eyes are on this gathering of the most outstanding large-scale models in Europe.

A proper meet needs proper weather, and there were no complaints on this topic. Bright sunshine, a light breeze blowing straight over the runway and temperatures exceeding 95 degrees were what everyone wished for, and that's just what they got.

The meet at La Ferté Alais is a weekend event, and modelers who arrived on Friday used the time for their test flights.

Because of the size of the models flown here—some weigh more than 450 pounds, and all use engines of more than 60cc (3.60ci)—it is clear that safety is a vital issue at this meet. All models weighing 25kg (55 pounds) or more must have twin receivers and must pass flying and pilot-competency tests before being allowed to participate in the event.

All the modelers take every precaution to avoid accidents, and it's most impressive how electronic failures are reduced nearly to zero by the individual modelers.

Steve Holland's ⅓-scale DH-88 "Comet" was one of the models crammed with safety features. Since completing it, Steve has achieved more than 250 flights with it. The 22-foot model was a pleasure for the eyes, partly because of the way Steve displayed it. Two Zenoah 74cc engines provide the power for this birdie; its spinners and landing gear are custom-made.

"A bird of a different feather" is the Super Constellation by Raymond Melardy of Belgium. With a wingspan only 4 inches longer than the Comet's, this model features four ZDZ 12ci engines. Despite its massive size, this model seems to fly like a trainer. Watching the Connie during a low pass is a sight not to be missed!

The presentation of two Sopwith Pups by Günter

Push/pull aircraft are not often seen; this Dornier D-335 "Arrow" is one of a very few. Built by Arnim Morgenweck, the 120-inch model is powered by two 45cc engines.

Vietmeier and Dr. Ludwig Faber from Germany was another event highlight. Both were constructed from an enlarged Practical Scale plan with custom-made items such as the wheels, which were taken from a small bike. Because of their impressive smoke demonstration, the Pups were well loved by the audience and earned the Best in Show award.

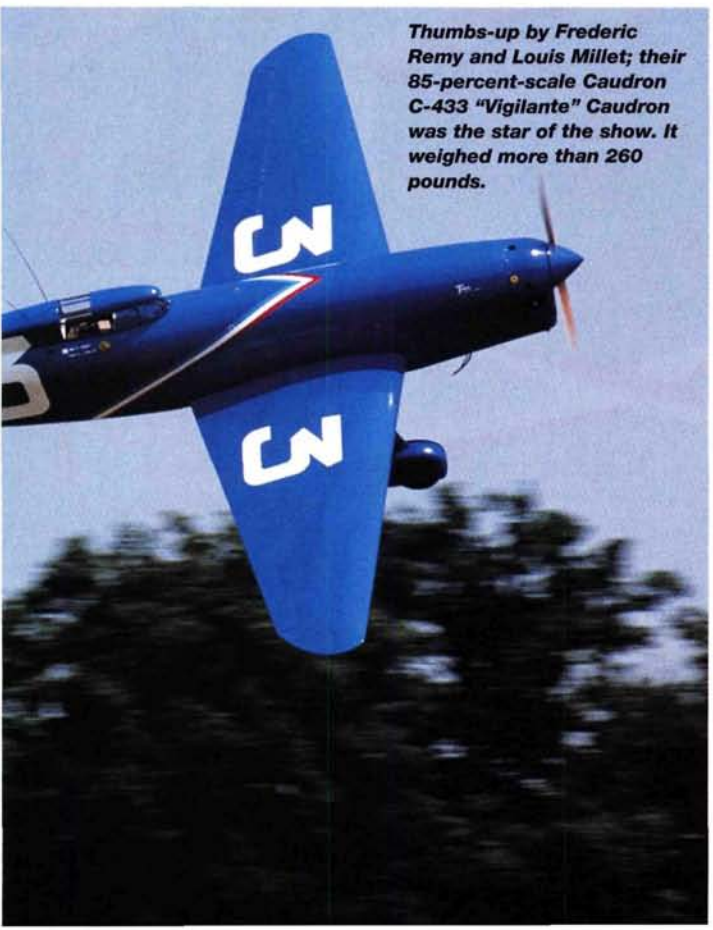
Another star of the show was the entry of Louis Millet and Frederic Remy: their 85-percent Caudron 433 can only be described as "giant-scale," as the photos attest. Designed by Frederic and constructed completely out of wood by Louis, this model attracted everyone's attention. It's powered by a JPX 340 engine (normally used for full-size ultralights) swinging a large prop at 2,400rpm. As you might expect, flying this bird requires proper preparation, although its flight behavior is very forgiving.

Another model worth extra attention was the B-29 Superfortress constructed and flown by the Belgian "Team Vercruysse," which was named after the model's pilot, Bart Vercruysse. With a wingspan of more than 29 feet, it currently holds the title of "largest model airplane in the world" and is listed in the Guinness World Records book.

It takes three people to fly this impressive model, and up to now, 40 flights have been made, many of them at large public demonstrations and fundraising events. Four ZDZ 160cc engines, each consuming about a gallon of fuel for each flight, are needed to get this baby airborne. Every flight is completely monitored at ground level with a telemetry system. To ensure maximum reliability, five receivers and a grand total of 16 batteries have been installed.

Nothing beats the sight of a bright yellow aircraft on a sunny day. One of two Canadair 215 firefighters at the event makes a water-bombing pass. This 244-inch model was built by Yann Dobignand.

DH Mosquito in photo-recon markings passes by, just seconds before losing a spinner.



Thumbs-up by Frederic Remy and Louis Millet; their 85-percent-scale Caudron C-433 "Vigilante" Caudron was the star of the show. It weighed more than 260 pounds.

For me and for many others, the top model at the meet had to be Jean Jegou's ⅓-scale Morane-Saulnier 230. This model had every rivet and hatch on it that the full-size aircraft had, and most of the features were functional as well. As a practice model, Jean first constructed a ¼-scale model of the design from the original factory drawings. When he was satisfied with the practice model, he then took the next logical step and made another one—even bigger!

The massive B-29 is pulled into the air by four ZDZ 160cc engines.

The "Connie" just lifting off, on its way to another display.

Powering this outstanding model is a Sachs 90cc engine, completely concealed behind the dummy engine that alone took him 900 hours to build. With this in mind, the three years Jean took to complete the model are well within bounds.

La Ferté is absolutely an event that anyone with a serious interest in large- and giant-scale modeling should consider visiting or, even better, participating in. If it's hot on the European scene, it is there! To see more photos of this incredible event, check out the French website http://site.voila.fr/IMAA2, or you can get the videotape from Propwash Video Productions, http://propwash.home.pipeline.com. ✈

Spirit of St. Louis

A scale modeler's dream

As an aviation photographer, I specialize in capturing historical old flying machines on film, and I never tire of it. However, not once did I think I would be able to photograph the *Spirit of St. Louis*. In fact, I never thought I would be within touching distance of it, much less be given carte blanche to shoot it up close.

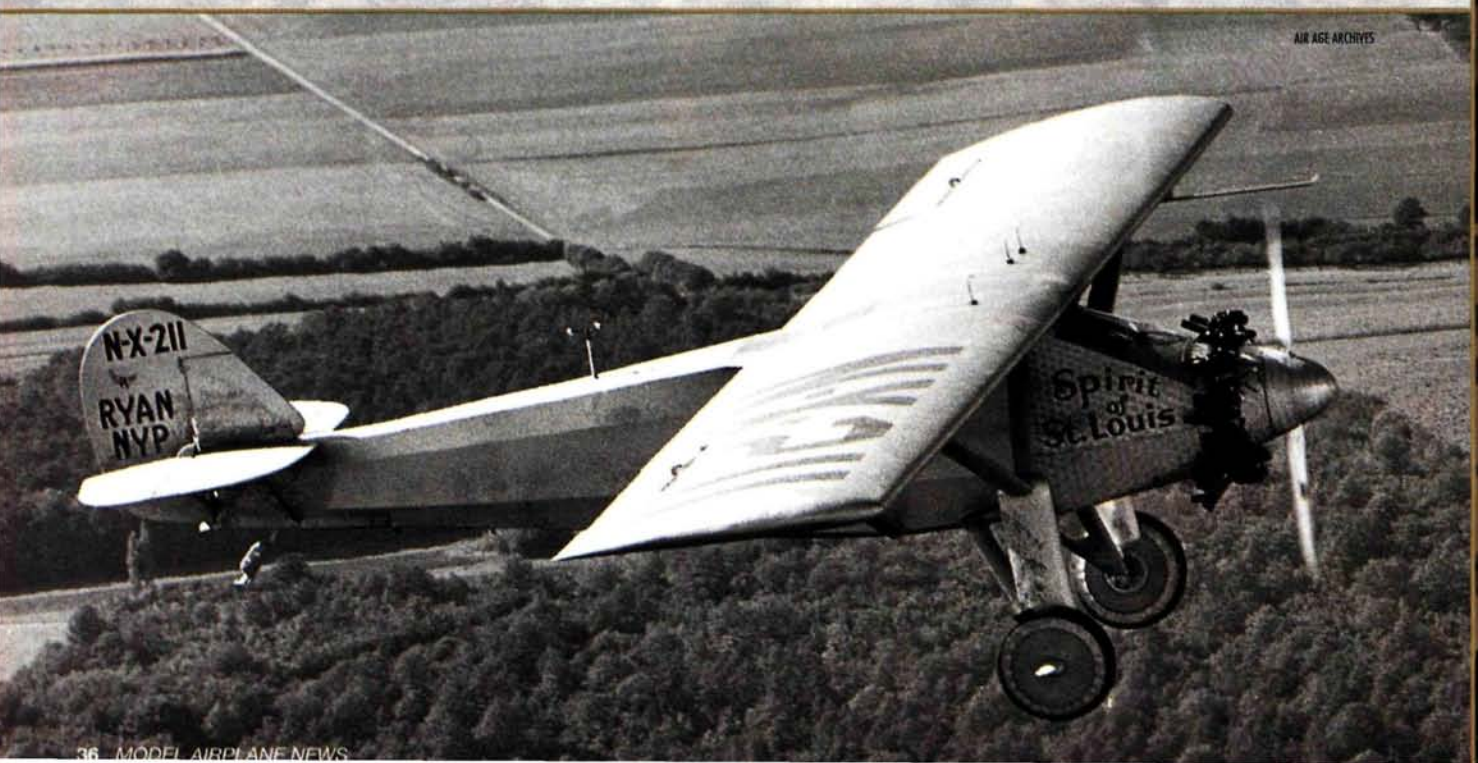
On October 31, 2000, Charles Lindbergh's historic machine was to be lowered from the ceiling in the National Air & Space Museum's "Milestones" gallery because the ongoing project of repairing the roof had finally come to the center gallery. Therefore, the tiny silver plane had to be lowered from its perch, but it was to be on the floor for only one day. Other than the museum's staff photographers, I was the only photographer permitted to shoot it. What a wonderful opportunity!

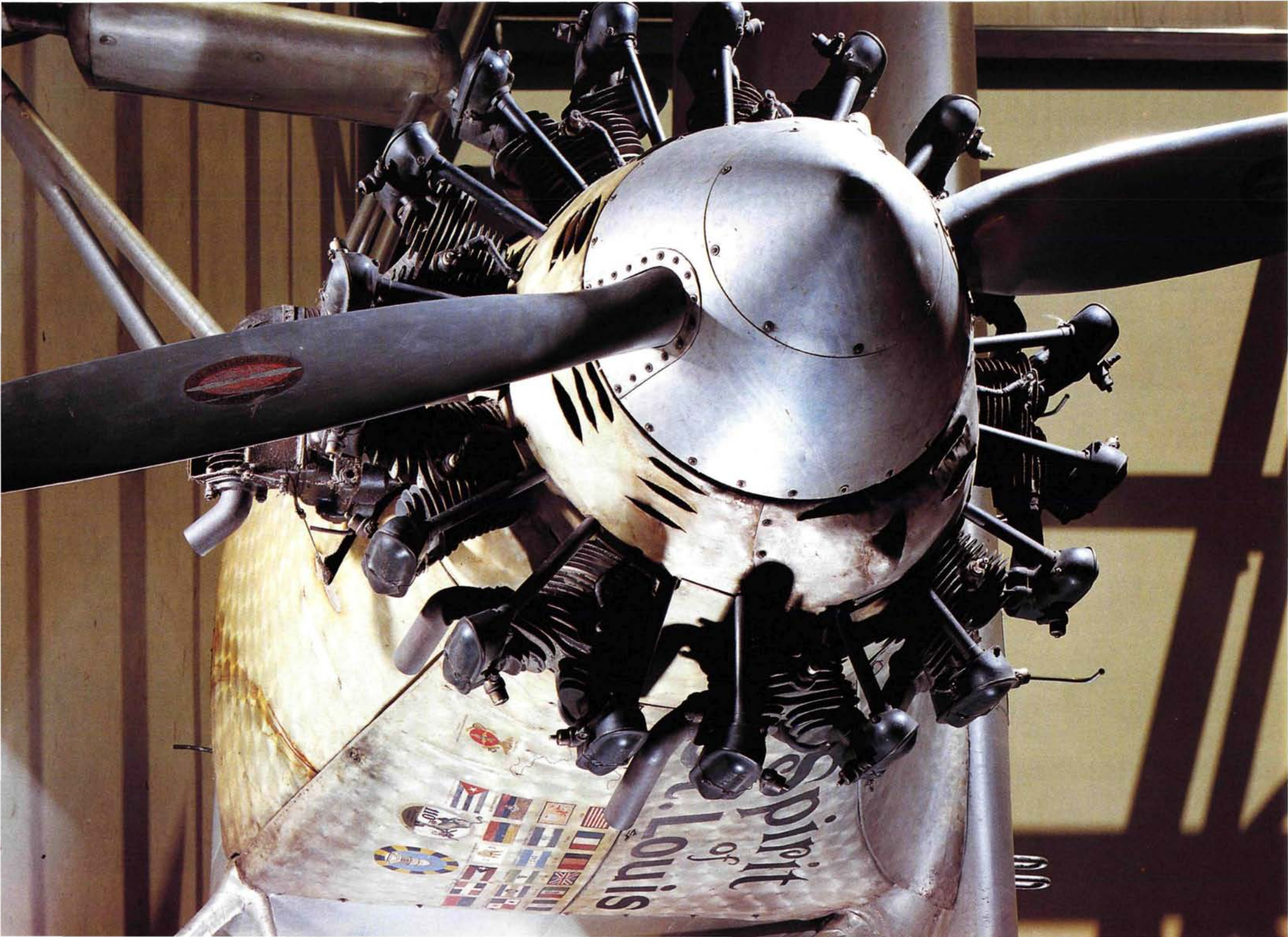
When you first approach it, you are astounded at how small it really is. Then, as you get a closer look at the cowl that surrounds the Wright Whirlwind engine with its textured metal that reminds you of fish scales, you see that it has signatures scratched into its surface. The names come from Haiti and other remote locations where Lindbergh landed on a goodwill tour to South America. Most are dated 1928.

The cockpit where Lindbergh sat in a wicker seat for 33½ hours is small. Knowing that there was no forward visibility does not diminish the surprise of how blank the space is where there would normally be a windshield. The fuel-tank plumbing below the instrument panel is a complex maze of pipes and petcocks. At the top right corner of the panel, the penciled notations that Lindbergh made to record his fuel uses and time elapsed are still there.

That night, the *Spirit of St. Louis* was hoisted back into the air once again, now in the west end of the museum, to be joined by the 1903 Wright Flyer. They will remain there until the roof repair is complete. Two days later, I photographed the original Wright brothers' airplane when it, too, was "on the floor" for just one day. It's not often a photographer has a week like that one!

—Dan Patterson

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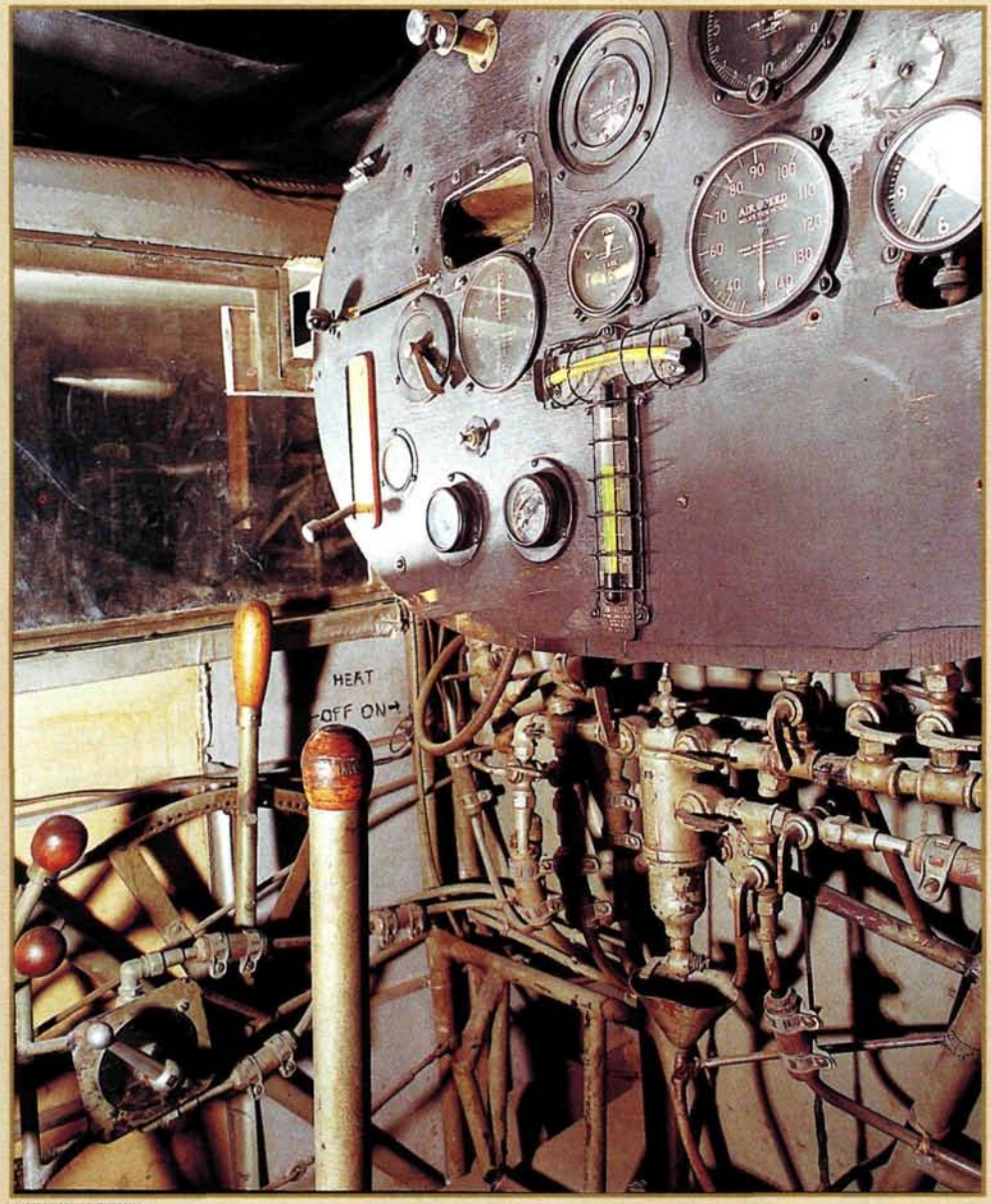
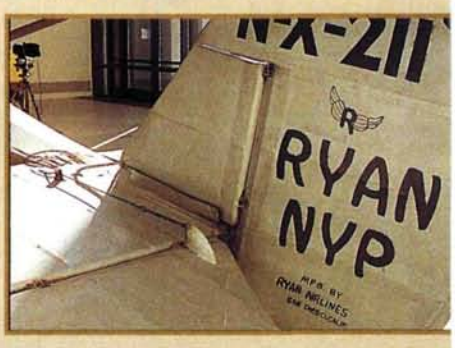


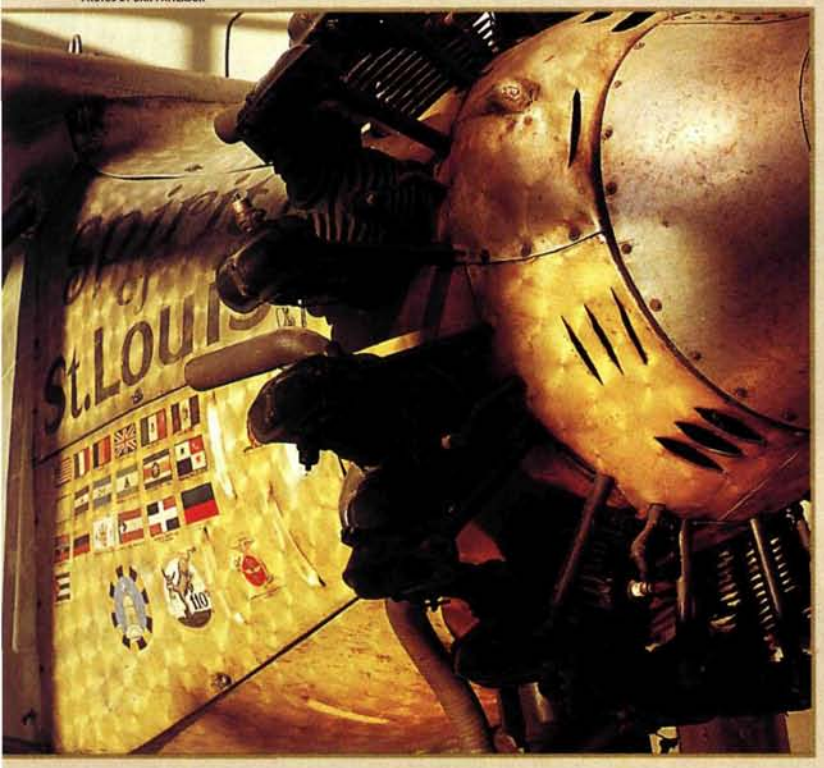
PHOTOS BY DAN PATTERSON

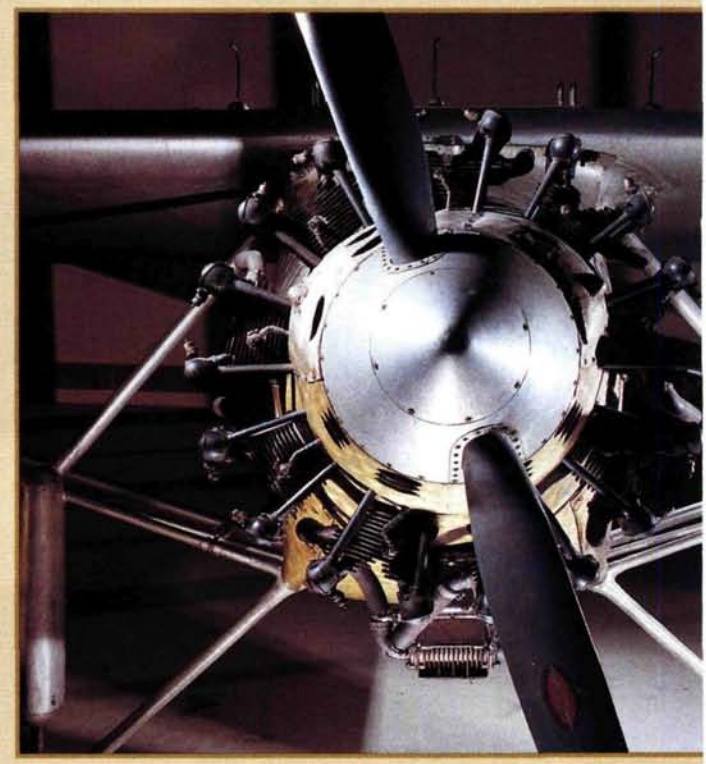
This page, upper left: the maze of plumbing and petcocks for fuel distribution from the various fuel tanks to the Spirit's lone engine must have kept Lindbergh on his toes for fear of moving the wrong one. Cowl shot: several of the "fish-scale-like" indents on the cowl have signatures from various well-wishers that Lindbergh met after his famous trip. Many of them are dated 1928. The "NYP" on the rudder stands for New York to Paris. Next page, lower left: Lindbergh's meticulous attention to detail during the trip included monitoring his fuel use, and time and distance checks. He notated these checks in pencil on the upper right-hand portion of the instrument panel.

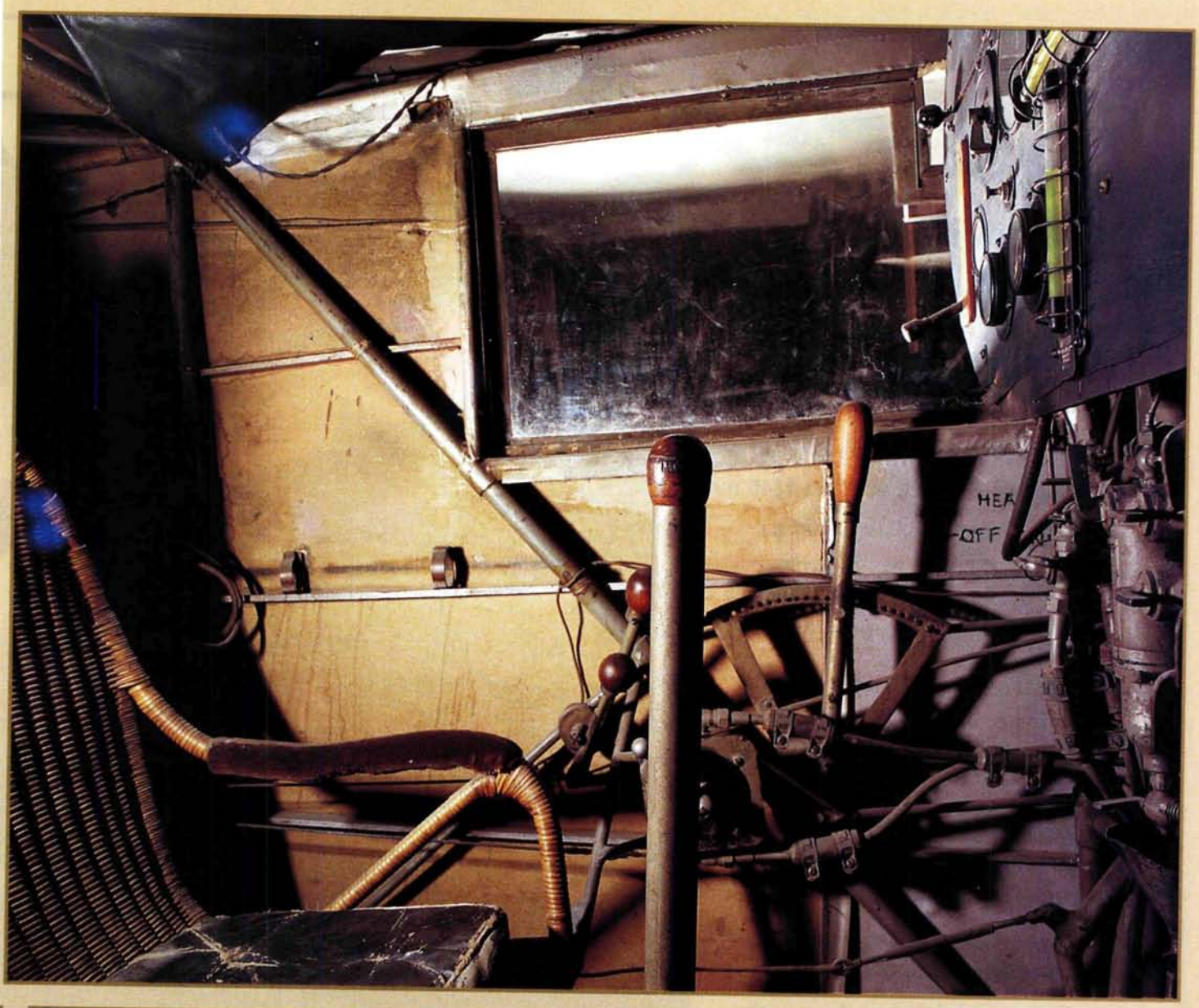
While the famous Ryan was on the ground, it sat on a very ordinary set of wheels and tires. I found the more recognized set of wire wheels with large smooth rubber tires leaning against the wall behind the tailfin. I asked a museum restoration specialist, who was there to rehang the airplane, about the wheels. He told me that the real tires were so fragile and brittle that they would not support the weight of the plane.

Photographing the Spirit of St. Louis was made possible by the Smithsonian's National Air & Space Museum as part of its support for the book, "The Aviation Century," being prepared by Ron Dick and me; it will be published in 2002. +





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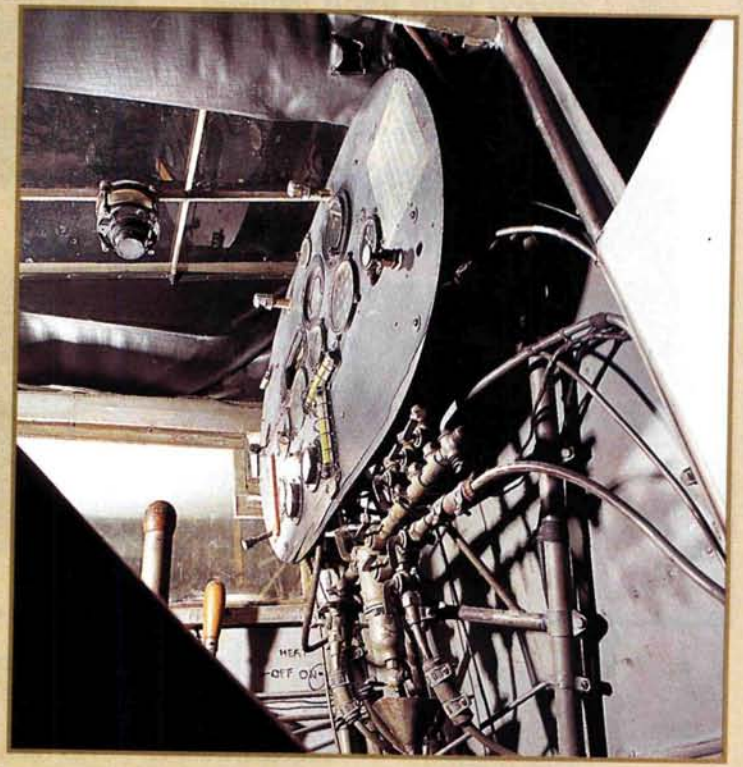
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MODEL AIRPLANE NEWS
PRODUCT REVIEW

GREAT PLANES RealFlight

Raining outside? Too windy to go flying, and it's the only day of the weekend you can make it to the field? Want to learn new maneuvers without risking your pride and joy? Why not fire up the computer and get some good-quality simulator time with Great Planes' *RealFlight Generation 2*? The idea of "flying" in any weather or at any time, in the comfort of home, should appeal to any modeler. Simulators are nothing new; military and commercial pilots use simulators to practice new maneuvers and to stay proficient; the principle works equally well for model pilots.

RealFlight G2 is the latest version of Great Planes' excellent flight sim. *G2* is user-friendlier than earlier renditions; you can make changes quickly and easily because it's now menu-driven. No more exiting the main screen—just point and click, and a Windows-based pull-down menu appears for easy adjustments. Also new is the multiplayer function; you can get together with up to seven of your flying buddies and meet at a virtual flying field via the Internet. Pretty cool!

WHAT DO YOU GET?

As you would expect, included are a CD and a Futaba transmitter case with a cord that plugs into your PC. If you want to use your own transmitter, an optional interface is available. No hard copy of the manual is included, as it's available on disc and online anytime you need it. You can print it out, but be prepared to use a whole lot of paper!

Installing *G2* couldn't be easier; just insert the CD and follow the onscreen instructions. You will be asked to calibrate the transmitter; that consists of centering the trims and moving the joysticks to the extents of their travel a few times. Once you've completed that, you're ready to start flying.

SPECIFICATIONS

Product: RealFlight Generation 2

Type: RC flight simulator

Manufacturer: Great Planes Model Mfg. Co.

Minimum system requirements: Windows 95, 98, 2000, or ME; Pentium 300 or equivalent processor (450 for multiplayer); 32MB RAM (64MB for multiplayer); 500MB hard-drive space; 3D-accelerated video card with 8MB video RAM; DirectX 8.0- (or above) compatible video and sound card; 4X CD-ROM drive; game port; multiplayer also requires LAN (IPX/SPX or TCP/IP protocol) or Internet access (TCP/IP connection requires an Internet account and 28.8kbps or faster modem). Great Planes recommends a Pentium 600 processor, 64MB RAM and 3D video card with 16MB RAM.

Price: $249.99 (includes Futaba controller)

Features: realistic models (17 airplanes, 11 helicopters), sound effects and cool scenery; pull-down menus for instant changes; accurate model renderings and flight performance; more than 200 customizable features for models; Virtual Flight Instructor (VFI) teaching aid; compatible with previous RealFlight add-on packs.

Comments: RealFlight G2 is easy to install and easy to use; models use high-resolution graphics rendered from photos of real models complete with spinning propellers and moving control surfaces. The unlimited terrain editor lets you create your dream flying field, and the VFI makes G2 a great learning tool for novices. This program is also upgradable via the website and is supported online.

HITS
- Easy installation.
- Realistic models, scenery and sounds.
- Accurate flight performance.
- Virtual Flight Instructor.
- Excellent online help.

MISSES
- None.

G2 The next generation of flight simulator

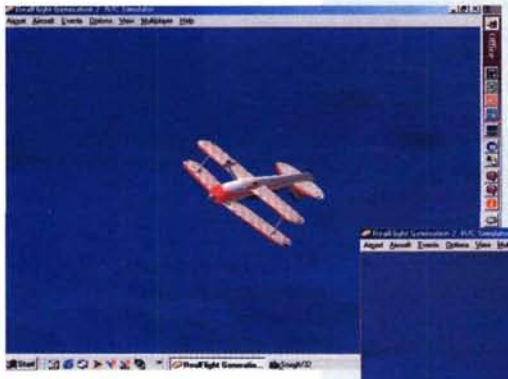
by Rick Bell

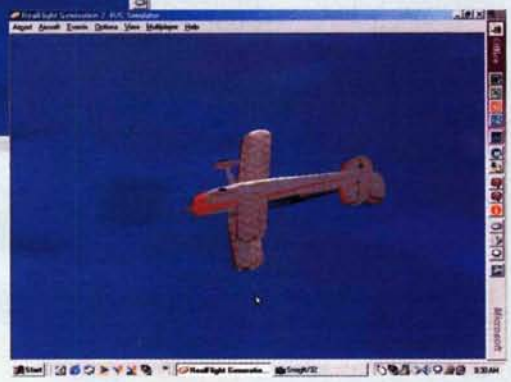
FEATURES

G2 has a long list of unique features that includes Virtual Flight Instructor (VFI; more on this later), flying and training aids, multiplayer, multicam, onscreen transmitter, heads-up display, limbo and pylon racing. The 3D Doppler sound is very cool. You hear the plane approaching and getting louder as it nears, then fading as it passes, just as if you were at the field—very realistic! You heli fans will also hear the Doppler effect on the main blades and engine.

Want to customize your aircraft? *G2* has over 200 parameters for planes and more than 300 for helis, all of which can be edited. Change motors, props, rotor blades, CG, weights, or sizes—all by clicking your mouse. Using your own measurements, you can build your own plane or heli to your exact specifications. Want more? *G2*'s VFI features instructions recorded by RC expert Mike Cross (two-time IMAC freestyle champion) and heli expert Dwight Shilling (three-time U.S. F3C world qualifier). You can pull up prerecorded maneuvers to see how they're done, then try them yourself. You can also put a transmitter onscreen to show proper stick movements while you're flying.

One of the biggest problems with flight sims is that they limit your perspective; it's difficult to land because you can't see the ground. *G2* now has a "look at ground" feature that zooms out to keep the ground in view. Finding the runway has become a lot easier. Need more orientation clues? Use the "Heads Up NavGuide" that can display just about anything, from altitude to speed and heading. And there is the multicam, which can display your aircraft from various angles; you can size and position the view to suit your needs. These are only a fraction of the features that *G2* offers.





Left: its accurate flight performance is the key to the success of the* RealFlight *sim.* Generation 2 *does it even better than the original; for even more realism, it has additional 3D graphics that are spectacular.

Above:* RealFlight G2 *allows you to zoom the image of your plane in and out. The ability to change angles enhances your perspective when you're flying.

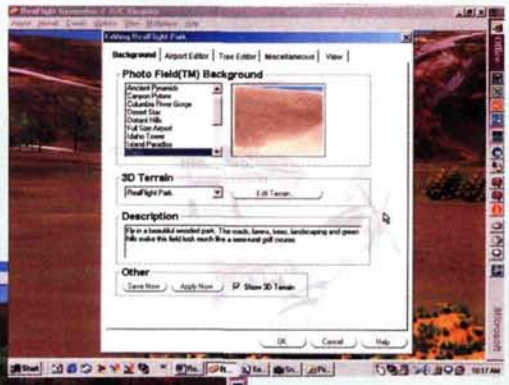
Left: the Multicam feature allows you to create viewports to simultaneously view your airplane from many angles. This is particularly useful for gauging distance and your orientation to the ground when you're doing aerobatic maneuvers.

AT THE VIRTUAL FIELD

So how does *G2* work? Very well, in my opinion! There are many planes and fields to choose from, and the graphics are stunning. You can position the runway in any direction, add trees, buildings and a host of other objects and place them anywhere you want. But be careful not to hit anything; unlike earlier versions of *RealFlight*, you will crash if you hit something. When you start *G2*, you get a "Tip of the Day" that tells you about a particular feature of the program. You can opt to turn this off, but I find it useful.

When *G2* opens, you'll notice the menu bar across the top of the screen; from here, you can drop down the menu you want and choose your airport, aircraft and any objects you want displayed. From there, you can get into sub-menus to refine and edit the terrain with trees and other items. *G2* lets you choose from 17 airplanes and 11 helis—plenty of choices to satisfy any modeler. One feature that I like from the options menu is the ability to choose the background music that plays while you're flying. Don't like

When putting* G2 *together, its designers paid attention to everything; even the pits and spectators are highly detailed. The scenery isn't just for show, either; if you fly into one of the tents or trees, you'll crash.



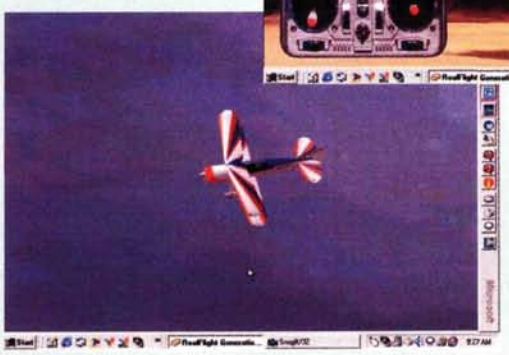
Right: a pop-up menu allows you to choose from a variety of flying environments. Every airport provides a beautiful backdrop for your flights, and each presents a different set of challenges to help you learn to be a better pilot.

Left: better yet, each airport has dozens of features that you may customize to suit your taste and level of proficiency. Don't like those trees there? Move them!

Right: one of G2's highlights is the Virtual Flight Instructor (VFI). You specify the type of aircraft you want to fly and at which difficulty level, and the program presents you with a schedule of lessons and then takes you, step by step, through each maneuver.

Left: the onscreen transmitter display is a particularly helpful learning tool. As you maneuver, the display shows you exactly where your sticks are and where they should be, so you're able to see exactly where you made your mistake.

Right: the combination of VFI and on-screen transmitter functions helps you to master complex maneuvers without endangering your pride and joy. Try learning inverted heli flight out at the real field and see how many rotor blades you go through!



Left: with **RealFlight**, *you can fly no matter what the conditions at the field, but it isn't all clear skies and sunshine. You can simulate bad weather to hone your skills—without having to put on a coat.*

More planes, more fields, more fun!

Fans of the original *RealFlight* will recall that one of its highlights was the availability of two add-on volumes containing extra models and fields—software that *RealFlight G2* also supports. But Great Planes knows that with the excellent *G2* now available, the demand for new planes and new flying environments will be stronger than ever. To meet it, they're hard at work on Volume 3, which will include more than a dozen new planes and five spectacular new venues. Among the new models are a ¼-scale Giles 202, Giant P-47D Thunderbolt and Extra 330L, the SlowPoke Sport 40 and the much-requested P-38 Lightning. For the first time, helicopters will be offered in an expansion pack with Thunder Tiger's ever-popular Raptor heli—in both .30 and .60 size—appearing in Volume 3. Among the new flying sites will be an indoor slow-flyer venue, as well as Great Planes' own test field, an Illinois farm, some Aztec ruins and coastal terrain with a lighthouse.

Volume 3 is compatible with all versions of *RealFlight*, but only *RealFlight* Deluxe and *G2* owners can use the Raptor helis. In addition, *G2* owners will enjoy expanded graphics and detailed special effects such as moving props and control surfaces. By the time you read this, Volume 3 will be available for $29.99.

the available music? You can supply your own and really rock! You can also adjust the various sound effects, such as engine, crash noises and wind, and you can control the volume. After you've chosen your field and plane or heli, the program places you on the runway—engine idling and ready to fly.

I was impressed with the feel of each model. Having flown many types of models over the years, I can say that *G2* duplicates RC aircraft very well; aerobatic types behaved as they should and were very maneuverable. Trainers were docile, warbirds had that "heavy-metal" feel, and the F86 model flew just as a jet model should. The turbine sound is awesome; be prepared to fly ahead of the model, though, as the turbine requires spool-up time.

As did earlier versions of *RealFlight*, *G2* has an incredible number of parameters that can be changed. Don't like the way that J3 Cub flies? You can change the wingspan and airfoil, propeller diameter, pitch and number of blades. One new feature in *G2* is the ability to change color schemes using a third-party bitmap editor; I used Adobe Photoshop 5.5 with great results. Many alternate color schemes are also available for downloading on the *RealFlight* website at www.realflight.com.

Another new feature of *G2* that's excellent for beginners is the VFI. An instructor explains how to do various maneuvers, from beginner level to advanced, using an appropriate aircraft to demonstrate; e.g., a high-wing trainer for novices, an Ultra Sport for intermediate students and an Ultimate bipe for advanced maneuvers. A transmitter is displayed on the screen to show the stick movements for the chosen maneuver. You can follow along and record your attempt for playback later. The same feature is offered for heli pilots. This is a great tool for learning new tricks and then showing off at the field.

CONCLUSION

To sum up, *RealFlight Generation 2* flight simulator is, in one word, amazing! *RealFlight* has been extensively reworked with outstanding results. It's now easier to use, offers many new models to fly, and with the VFI flying and training aids, it makes a fantastic learning tool for beginning RC pilots. ✈

Futaba Corp. of America; distributed by Great Planes Model Distributors Co.; www.futaba-rc.com.
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Almost-ready-to-fly classic scale warbird

LANIER RC

F-4U CORSAIR

by Jim Onorato

A few planes are immediately recognizable to all aviation enthusiasts, and the F-4U Corsair is certainly one of them. This gull-winged beauty has been a favorite of RC scale modelers for years. Now, the average modeler can enjoy owning and flying this WW II classic without spending hours to build one. Lanier RC, the pioneer in almost-ready-to-fly (ARF) models, recently introduced its 21st Century ARF model line that features the F-4U Corsair and several other .40-size warbirds, such as an AT-6 Texan, a P-47 Thunderbolt and an F-4 Phantom.

WHAT'S IN THE BOX?

The kit includes everything you need to get in the air except a radio, an engine, a propeller, and fuel tubing, and you may also want to add a scale pilot figure, as I did. It comes with a painted fiberglass fuselage and cowl and a painted canopy. The wings and tail feathers are built up and covered with iron-on film. The model is medium blue, and the painted parts perfectly match the film-covered parts. Also included are wheels, a motor mount, a fuel tank, prebent landing gear, decals, pushrods and a complete hardware package. The instruction booklet has photos, nine pages of sketches and a parts list. Although this Corsair kit is better suited to intermediate builders, the instructions are detailed enough that even a beginner could easily assemble it.

PHOTOS BY WALTER SIDAS

SPECIFICATIONS

Model: F-4U Corsair 40 ARF

Manufacturer: Lanier RC Inc.

Type: sport-scale warbird

Length: 42 in.

Weight: 5 lb., 4 oz.

Wingspan: 55 in.

Wing area: 485 sq. in.

Wing loading: 24.9 oz./sq. ft.

Prop used: Master Airscrew 11x6

Radio req'd: 4-channel with 5 servos

Radio used: 7-channel Futaba FP-T7 UAF with 5 Futaba 3003 servos

Engine req'd: .40 to .50 2-stroke or .48 to .70 4-stroke

Engine used: O.S. FS-52 Surpass

Street price: $199.99

Features: ARF with painted fiberglass fuselage, cowl and canopy; built-up wing and tail feathers covered with iron-on film; hardware and decals included; easy-to-follow instructions with photos and sketches.

Comments: I really like this one! The Lanier Corsair is a pleasure to build and fly. It features a superb finish on the fiberglass fuselage, and it has a great scale appearance both on the ground and in the air.

Hits

- Excellent overall appearance.
- Good, scale flight performance.
- Easy-to-follow instructions.

Miss

- Incorrect formation of landing gear.

The Corsair comes almost completely built and is covered with iron-on covering straight out of the box. The kit includes everything shown here.

ASSEMBLY

After reading the instructions to get a feel for how the Corsair goes together, I began to assemble the wing; it consists of four sections: the center, two outer pieces and a fiberglass belly pan. Two 3/16-inch-plywood dihedral braces join the wing panels. I glued the short end of the braces into the center section of the wing with 30-minute epoxy.

Pull strings for the servo leads are already installed in each section of the wing. Before attaching the outer panels, I tied the strings together and then joined the outer panels to the center section by applying 30-minute epoxy to the inside of the slots in the outer panels and 5-minute epoxy to the root ribs of the panels. Be careful not to glue the string between the sections. The ailerons come hinged, and the hinges need only some thin CA.

The Corsair uses one aileron servo in each outer panel. I attached one Futaba 3003 servo to each of the servo covers and installed them in the wing with four small screws. With the included hardware, I installed the aileron control horns and hooked them up to the servos.

The provided control horns are unique. They consist of a 3mm machine bolt molded into a triangular plastic base. A plastic fitting, to which the pushrod clevis will be attached, is threaded onto the bolt; this makes the control-horn length adjustable. Attach the control horns to the control surfaces with three self-tapping bolts that thread into matching triangular backing plates.

After I began the installation of the prebent landing gear, I noticed that the gear was bent in such a way that the wheels would be on the inboard side of the struts rather than on the outboard side. Besides being non-scale, this would have made the Corsair very unstable on the ground, so I made a new set of landing gear. I also replaced the rather small wheels that came in the kit with a pair of 2¾-inch Robart scale wheels and added a pair of Robart strut covers to give the Corsair a more scale appearance.

Last, to complete the wing assembly, I installed the fiberglass belly pan. After I removed a 1/16-inch-wide strip of covering along the glue line, I simply epoxied the belly pan to the underside of the wing. For this step, it is best to temporarily attach the wing to the fuselage so the belly pan can be properly aligned.

Because the plane comes almost complete, there really isn't much work to be done on the fuselage. I mounted an O.S. FS-52 4-stroke sideways on the beam-type engine mounts that are included in the kit. The firewall is offset to provide built-in right thrust, so you must mount the engine a little to the left of center so that the prop shaft will be centered in the cowl. The instructions include a template for mounting an inverted engine.

The firewall is offset to provide the built-in right thrust, so the engine must be mounted to the left of center. The O.S. FS-52 produces steady, realistic flight.

After I attached the engine, I installed the plain-wire throttle pushrod with a Z-bend at the carburetor and an EZ connector at the servo end. I then assembled the fuel tank and installed it through the large hole in the firewall.

I attached the built-up tail feathers to the fuselage with 30-minute epoxy. Like the ailerons, the elevator and rudder hinges were already in place and needed only to be glued with thin CA. The control surfaces are connected to the servos with the provided hardware. The elevator halves use a conventional Y-type pushrod, and the rudder uses a pull/pull cable system—both of which are exposed at the tail end.

I installed the cowl with four small screws into four hardwood blocks that had

FLIGHT PERFORMANCE

I like to take things a little easy with a new airplane, especially a scale type, so I set the controls to low (75 percent of the recommended throws) for the first flights.

• TAKEOFF AND LANDING

I pointed the Corsair down the runway, applied a little up-elevator to keep the tail down and then advanced the throttle. As soon as the plane began to roll, I released up-elevator to let the tail come up. The plane tracked beautifully with just a touch of right rudder. I was glad I had changed the position of the wheels. When I attained flying speed, I applied just a touch of up-elevator, and the Corsair lifted smoothly into the air with its wings perfectly level.

This plane turned out to be more of a floater than I had anticipated. When I was ready to land, I just chopped the throttle to idle and used a little up-elevator to bleed off some airspeed. Wheel landings were routine; the larger wheels really helped on the grass runway.

• SLOW-SPEED PERFORMANCE

The Corsair flew smoothly at low throttle and remained responsive to the controls. I tested its stall at a safe altitude and found the stall to be gentle and straight-ahead. The model looked so pretty in the air that I flew it at ½ throttle most of the time, just to admire its realism.

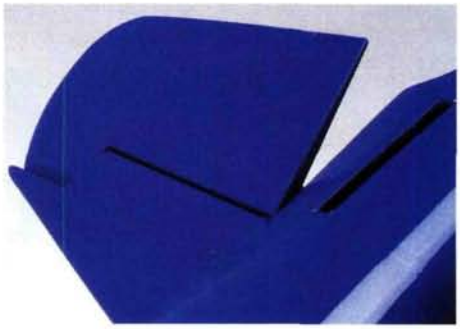
• HIGH-SPEED PERFORMANCE

With the O.S. FS-52 4-stroke engine at full throttle, the Corsair was not what I would call fast; it flew at a respectable speed and handled well at all speeds. I imagine that it would be a real "barnburner" with a .70 4-stroke up front, but I don't think it would fly as realistically as it does with the smaller engine.

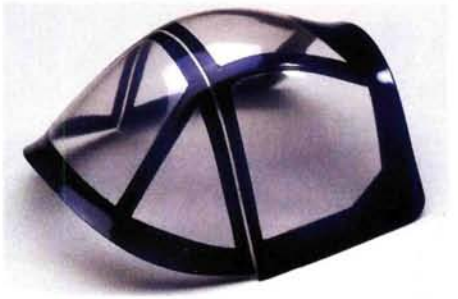
• AEROBATICS

The Corsair was not designed for aerobatics, but it will perform loops, rolls, spins and combinations of those moves. Inverted flight requires quite a bit of down-elevator, but that really looks out of character for a warbird. My favorite maneuver is a low, high-speed pass down the runway followed by a graceful victory roll. Black Sheep Squadron, here I come!

F-4U CORSAIR



The tailpieces come built up and need only to be attached to the fuselage with 30-minute epoxy.



This prepainted canopy contributes to the Corsair's great scale appearance.

been factory-glued to the firewall. I then added a Hangar 9 ⅛-scale pilot figure and glued the canopy into place.

Although the kit comes with a set of decals, I wanted to duplicate the markings on the Corsair that's on my computer screen, so I decided to make my own. With my Stika cutting machine, I cut the graphics from a sheet of vinyl.

CONCLUSION

Lanier RC's F-4U Corsair .40 was a pleasure to build and fly. It is well made, goes together easily, and the finish on the fiberglass fuselage is superb. The plane looks very scale on the ground and in the air. If you've avoided building a Corsair because of the complexities associated with a gull wing, then wait no more.

Futaba Corp. of America; *distributed by Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com; www.futaba-rc.com.*

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Robart Mfg., *P.O. Box 1247, 625 N. 12th St., St. Charles, IL 60174; (630) 584-7616; fax (630) 584-3712; www.robart.com.*

Stika; *distributed by Sky Aviation, 1 Transborder Dr., Champlain, NY 12919; (450) 449-0142; fax (450) 449-0144; www.stika.com.*

MIDWEST PRODUCTS

Little CAP 232

by Roger Post Sr.

When you come up with a great design of a large-scale, aerobatic model but want it to appeal to modelers who fly average-size planes, what should you do? Why, simply what Midwest Products has done with its Mike McConville-designed, 1.20-size CAP 232: scale it down to a .91-size sport plane. The result is the Little CAP 232—a 62-inch-wingspan, sport-size, scale-aerobatic model.

INSIDE THE BOX

The quality of the kit's materials was quite good, and the cut-out parts weren't "die-crunched." The full-size plan is well-drawn and quite clear, and the instruction manual contains concise directions and drawings. The supplied hardware is topnotch and contains almost everything you will need to complete the model. There are, however, several items you'll need, including 2¾-inch wheels; a 1-inch tailwheel; a 2¾-inch spinner; an engine mount; a 12-ounce fuel tank; 18 plastic hinges and four solder clevises.

CONSTRUCTION

This model is for builders with advanced building experience.

• **Tail surfaces.** The horizontal and vertical stabilizers and the rudder and elevator halves are built up from balsa sticks. To ensure their fit, I cut all of the required pieces and pinned them into place over the plan before I glued anything together. When the assemblies were completed, I sanded them to shape.

• **Fuselage.** This is of the interlocking-box, self-aligning construction method—extremely strong and rigid, but a method that requires you to follow the assembly instructions in the order they appear; also, as you proceed, you must follow the important construction notes. The fuselage is built upside-down, as its formers are glued to its top piece and then the sides are added. Be sure to build a right and a left fuselage half.

Once the main box has been built and the longerons have been added, the supporting landing-gear mounting blocks, their

SPECIFICATIONS

Model: Little CAP 232

Manufacturer: Midwest Products Inc.

Type: scale aerobatic

Wingspan: 62 in.

Wing area: 694 sq. in.

Airfoil: symmetrical

Weight: 8 lb., 2 oz.

Wing loading: 27.08 oz./sq. ft.

Overall length: 54 in.

Engine req'd.: .46 to .61 2-stroke or .70 to .91 4-stroke

Engine used: Saito FA .91GK 4-stroke

Propellers used: Master Airscrew 14x6 and APC 12.5x10

Radio req'd: 4 channels w/5 servos

Radio used: JR X-783

List price: $199.95

Features: balsa and die-cut, lite-ply parts; full-size plan; aluminum landing gear; molded clear canopy; ABS cowl and wheel pants; 48-page construction manual; pull/pull rudder cables; tail-wheel and bracket; various control horns and screws.

Comments: this kit is for the advanced modeler who has some building experience. In the air, it's a great aerobat that can do it all.

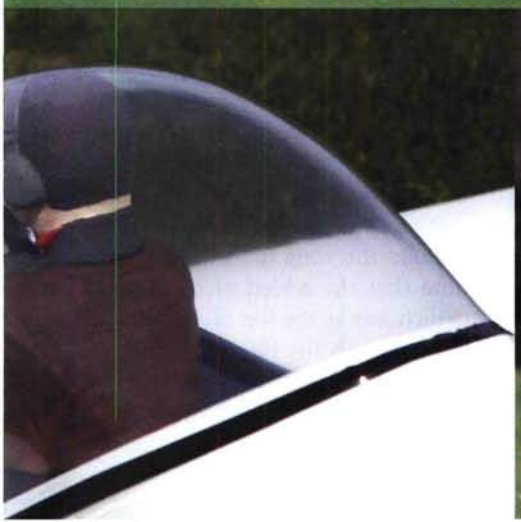
Hits

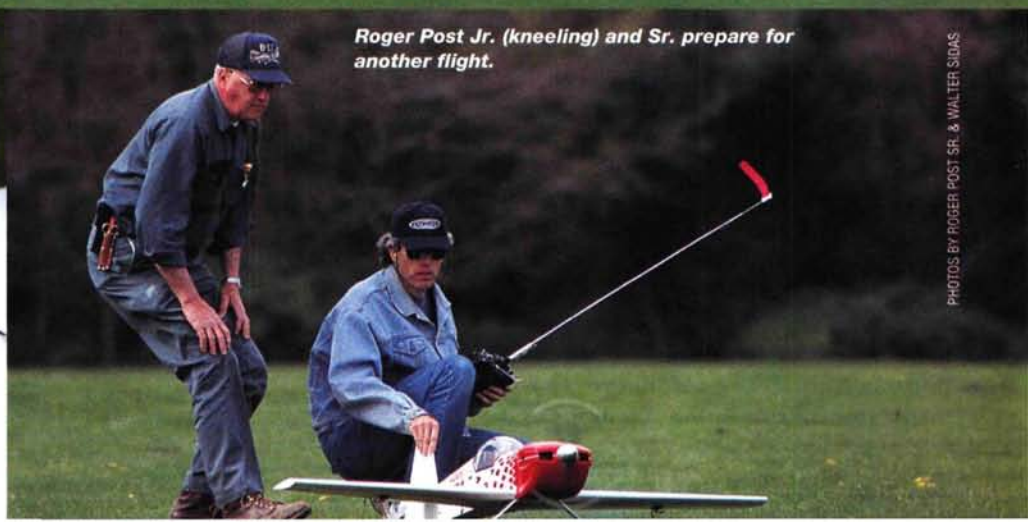
- Strong construction design.
- Scale appearance.
- Great flyer with super handling qualities.
- Good-quality wood in the kit.

Miss

- Hardware package doesn't include basics such as hinges, control horns, mounting screws, etc.

Big performance in a small package





Roger Post Jr. (kneeling) and Sr. prepare for another flight.

PHOTOS BY ROGER POST SR. & WALTER SIDAS

FLIGHT PERFORMANCE

After a run-up of the Saito .91GK 4-stroke to check rpm and throttle response, I taxied the CAP into takeoff position. At this time, I was using a 14x6 propeller turning 8,100rpm (static) at full throttle. The low rates were also set on the dual-rate switches.

• TAKEOFF AND LANDING

With these settings, the model used about 90 feet of runway to take off. With the built-in right thrust and the large rudder, very little right rudder was required to maintain direction control. With the low-rpm setting and low-pitch propeller, the climb-out was a bit slower than anticipated. When the Little CAP was at a safe altitude, I reduced the throttle to ⅔ and added some up-trim to arrest the slight diving tendency; no other trim inputs were necessary. It certainly is a point-and-go airplane.

To land the Little CAP, switch back to the low rates and maintain a higher than normal approach speed (about ¼ throttle). Fly it to the end of the runway, and when it arrives there, gradually reduce the throttle and let the model descend to the ground. Keep the wings level and flare the 232 a few inches before it touches down. I found it to be a hot-flying model that needed an extra bit of speed for the landing. If you bring it in behind the power curve and the engine quits, lower the nose immediately to regain some airspeed. I don't, however, recommend this type of approach technique.

• LOW-SPEED PERFORMANCE

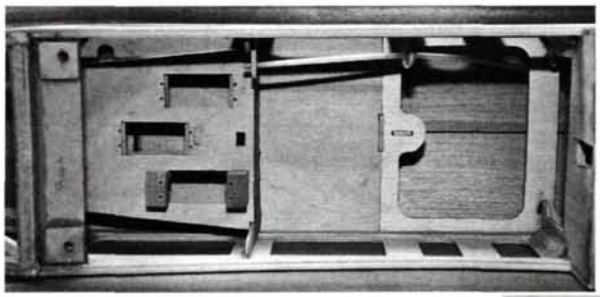
Although this is not its best category, the Little CAP will fly slowly with a somewhat high angle of attack and a ⅔ or so throttle setting. This works even better when there is a strong headwind. To help stabilize the low-speed performance, I programmed the ailerons to act as flaps. If you use this setup to try to slow down the approach speed, practice it a few mistakes high before you actually attempt a landing.

• HIGH-SPEED PERFORMANCE

This is where the Little CAP excels. At full throttle with the Saito .91GK swinging a 12.5x10 APC, the model was estimated to be going 90mph-plus. It never waivers from its flight path unless you command it to do so, and because of its speed, it quickly eats up a lot of the field during those high-speed, hot-dogging passes. Before you make an abrupt turn or maneuver, slow it down to avoid structural damage. The Little CAP will perform most maneuvers at throttle settings of ⅔ to ¾.

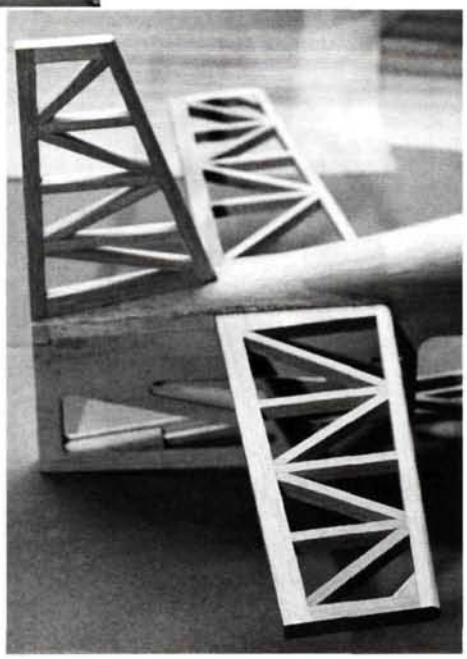
• AEROBATICS

This category is limited only by your abilities and imagination. The Little CAP will do them all, including 3D maneuvers: waterfall, elevator and Harrier. As for the standard loops, rolls and spins, the 232 does them effortlessly. It is a great flying machine, and I recommend it to all intermediate and advanced pilots who want to build up or refine their aerobatic abilities.



Left: the interlocking construction design of the fuselage makes for a strong and rigid airframe. There's plenty of room for any standard-size radio system.

Below: the horizontal and vertical stabilizers are built up from balsa stock; the cross-braces and gussets help provide rigidity.



triangular stock supports and the one-piece landing-gear mounting block are epoxied into place. At this time, drill the holes for and then install the landing-gear bolts and blind nuts. Drill the holes for your engine mount in the firewall, and finish the front of the fuselage. I powered my Little CAP with a Saito FA .91GK 4-stroke (see the sidebar) and used a Dave Brown 90FS engine mount to attach it to the firewall. It is a solid mount and can take quite a bit of punishment. Sand the front to shape and then turn over the fuselage.

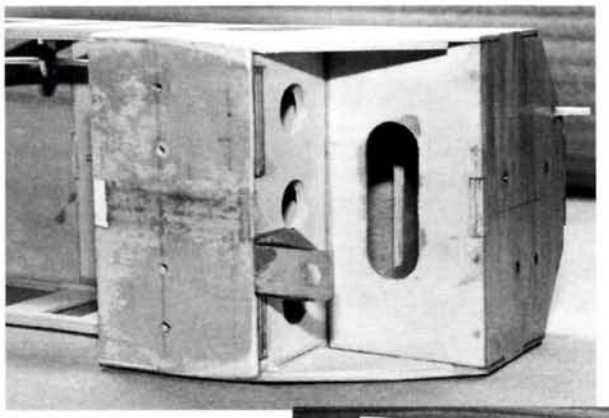
The fore and aft turtle decks are now built and sanded to shape, so add the two balsa rails to the sides of the cockpit area. Temporarily place the horizontal and vertical stabilizers into their positions and install the tail blocks per the instructions. Remove the stabilizers and carve and sand the tail blocks to shape.

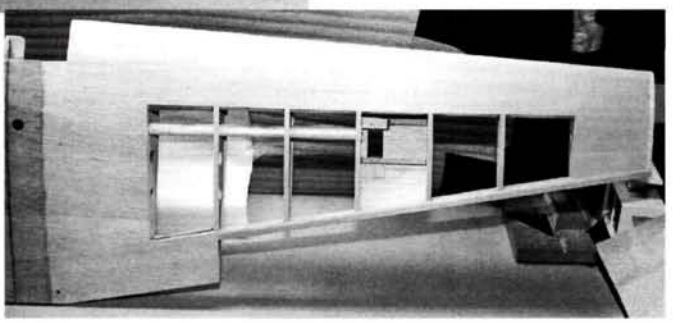
Trim the canopy and place it on the fuselage; trace the front line of the canopy onto the aft portion of the forward turtle deck, and cut this out as indicated in the manual. The cowl is now assembled. Although the supplied cowl is fine, I used a fiberglass cowl from Aeroglass. It is much stronger than the supplied styrene cowl, and in my opinion, it will be more durable. You can now fit the cowl to the nose of the model and cut out all of the necessary holes.

The installation of the servo tray completes the fuselage's construction.

• **Wing construction.** Each half is built upside-down over the plan, and each rib has a jig tab on its top aft area. These tabs help to keep the wing straight during assembly. Note that the dihedral brace has an arrow on it that should—as it is used—point toward the wingtip for the installation of the first eight ribs and toward the root for ribs nine and 10.

Build the wing halves as indicated, and note that the added piece of scrap balsa (which acts as the top of a false rib) should be flush with the top of rib W-9, and that the dimensions for the balsa face should be ⅛x1⅞x2^{1}⁄$_{16}$ inches. That was the size I had





Left: the nose section of the airframe is solidly designed, and the firewall has the right thrust built into it. The extra gusseted tab is for the Du-Bro remote-fueling device. Below: one of the nice features of the wing's design is the cardboard tube that is provided for snaking the aileron-servo leads from the servo to the wing's center. The extra block in the servo bay was added to the servo rail because shorter-than-standard-length servos were used in the wing.

to cut it to so it would fit between ribs W-9 and W-10A. This piece, however, is not yet glued into place. The shaded part of the drawing in this section of the manual is incorrect; the balsa face should butt against rib W-10A, not go into it.

Finish the wing halves' construction—shaping and sanding as indicated—and note that the ailerons are built into the trailing edge. They will be cut out before the halves are joined. After you join the wing halves, drill the holes for the wing bolts and add the two scrap lite-ply pieces that protect the balsa sheeting around the holes. Add the two balsa face pieces between ribs W-9 and W-10A, and complete the wing by securing the center section with fiberglass tape, as shown.

• **Mounting the wing and tail surfaces.** This is not difficult, but check to ensure that the wing and tail surfaces are properly aligned. With the wing aligned, drill the two 3/16-inch holes; then remove the wing and redrill *only* the wing holes using a 1/4-inch bit. The fuselage wing-bolt holes are tapped with a 1/4-20 tap.

At this point, you should check the wing and horizontal stabilizer's incidence requirements. It would be wise to set this up before you glue in the horizontal stabilizer, and check the wing's incidence to see whether it needs shimming.

After the stabilizers have been attached, add the tail filler as shown. This will complete the wood construction part of the assembly.

• **The tailwheel bracket and landing gear.** These should now be assembled and the tailwheel bracket temporarily fitted into place.

COVERING AND FINAL ASSEMBLY

After you fill and sand the airframe, cover it with your choice of film. I used 21st Century white, dark red and black iron-on film with great results; its matching dark red paint was used on the cowl and wheel pants. These products were easy to work with, and they produced a great-looking finish.

Before I installed the canopy, I glued into place the Midwest instrument panel (part no. 1107) and the Hangar 9 1/8-scale civilian pilot bust. I then attached the canopy and used color-striping tape to simulate the canopy's edge.

I hinged the control surfaces with Du-Bro's plastic hinges (part no. 117). To prevent the epoxy from seeping into the hinge joints, I used some petroleum jelly on the hinge-joint area. After the epoxy has dried, the jelly was easy to wipe away.

When you set up the control linkages, it is important to keep the nylon adjustment fittings that are part of the control horns for the elevator halves and the ailerons as far away as possible from their respective control surfaces. If you place them too close together, the result could be flutter. I also did the recommended control-surface gap-sealing to help counteract any flutter tendencies.

After I installed four JR 9011 servos for the control surfaces and a JR 517 for the throttle, I assembled and hooked up the linkages. Note that the rudder clevises are attached to the outer holes of the two control horns.

To prevent the engine's exhaust temperature from melting the covering, I added the required tin shield and then installed a Du-Bro 12-ounce fuel tank. After I added the tailwheel, the model was finished.

SAITO FA .91GK 4-STROKE

With its shiny black coating and gold-plated valve covers, the Saito FA .91GK looks impressive. What's even more impressive is how easily it starts, and after it is broken in, how much power it produces. I don't have all the fancy gadgets I would need to determine all of its attributes, but I can tell you that it's a very user-friendly engine. With the APC 12.5x10 propeller on the prop shaft, the thrust from the engine effortlessly hauled the Little CAP around the sky at a very quick pace.

Its break-in period consisted of running three tanks of fuel through it on the ground, adjusting the needle valve per the instructions and then flying the airplane with a moderately rich needle-valve setting. Each subsequent flight helped fine-tune the Saito to perfection until it was running at its optimum setting with a good transition from the low to high throttle. If you're looking for a powerful 4-stroke, try the Saito FA .91GK; you won't be disappointed.

I had to add a few ounces of weight to the nose to balance the Little CAP. Using the given aileron and elevator 3D rates as the high settings for the dual rates, I then set the recommended control-surface throws.

CONCLUSION

The Little CAP takes some time to complete, so it would be a great winter building project. The kit is well designed for snappy aerobatics and less than perfect landings and will supply hours of flying enjoyment. I think it is a great kit and recommend it to those modelers who have intermediate or advanced construction and flying abilities.

21st Century fabric; *distributed by Great Planes.*
Aeroglass, *Box 185, Langton, Ontario, Canada N0E 1G0; (519) 875-1533; fax (519) 875-1855.*
APC Props; *distributed by Landing Products, 1222 Harter Ave., Woodland, CA 95776; (530) 661-0399; fax (530) 666-6661; www.apcprop.com.*
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FIELD & BENCH
REVIEW

GREAT PLANES

Tracer

by Keith Palmer

.46-size sport pattern aerobat

The Great Planes Tracer is a .46-size entry-level pattern airplane that will surely make learning how to fly pattern maneuvers much easier for the average sport flier. The Tracer is almost as fun to build as it is to fly, and Great Planes supplies just about everything you need to frame it up. The kit includes high-quality balsa and lite-ply and a complete hardware package. You need only a .40 to .51 2-stroke or a .52 to .70 4-stroke engine, a 4- or 5-channel radio with six servos, wheels, a radio, covering and glue; retracts are available separately. The Tracer also comes with a well-illustrated instruction manual.

CONSTRUCTION

Begin construction with the tail feathers. Build the stab over the plans using die-cut center sections and a die-cut stab leading-edge (LE) support. Pin the center section and LE support over the plan then cut the outer framework and ribs and pin them into place. Secure the framework in place with a few drops of thin CA. After the glue has dried, lightly sand the stab top and bottom to remove any high spots and then sheet the framework.

To make the elevators, simply cut the tapered stock to match the plan, and sand a "V" on the LE.

The fin and rudder are constructed in much the same way as the stab. Simply cut the outer frame of the fin and rudder and the ribs and corner gussets, pin them to the plan and secure them with thin CA. I like to sand the fin and rudder at the same time to ensure they're of the same thickness.

PHOTOS BY KEITH PALMER & WALTER SIDAS

SPECIFICATIONS

Model: Tracer

Manufacturer: Great Planes Model Mfg.

Type: sport pattern

Length: 54 in.

Weight: 5 to 5.5 lb.

Wingspan: 52.5 in.

Wing area: 514 sq. in.

Wing loading: 22.4 to 24.6 oz./sq. ft.

Engine req'd: .40 to .51 2-stroke or .52 to .70 4-stroke

Engine used: O.S. .46 FX

Prop: Master Airscrew 11x6

Radio req'd: 4- or 5-channel w/six servos (1 for retracts)

Radio used: Futaba 6A Sky Sport w/FPS-38 servos

Price: $109.99

Features: die-cut balsa and ply parts; a clear canopy, an ABS cowl, a complete hardware package and easy-to-follow instructions.

Comments: the Tracer is an excellent entry-level sport pattern ship. It flies as well as most 60-size pattern airplanes, but at a fraction of the cost.

Hits

- Complete hardware package.
- Very light weight and rugged construction.
- Easy-to-follow instructions.

Misses

- Some die-cut parts needed additional cutting.
- Poor parts fit on fuselage.

WING CONSTRUCTION

First, you must decide whether you want to install retracts or fixed gear; the manual gives instructions for both. I decided to install the Hobbico retracts in my Tracer.

The first step is to punch out the die-cut parts. The die cutting on the lite-ply doublers was not very crisp, and quite a bit of cutting with a no. 11 blade was required to free the parts. I also had a problem with four of the ribs; they had wavy airfoil contours from the main spar to the trailing edge (TE), and I had to make new ones.

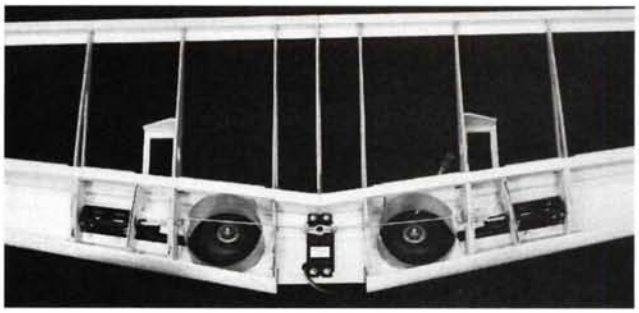
The next step is to build up the spars by gluing four 1/8x3/8x14 1/2-inch-long basswood spar doublers to four 1/8x3/8x30-inch basswood spars. Because I built the retract version, the next step was to glue the 1/8-inch plywood retract rib doublers to the corresponding 3/32-inch balsa ribs, then frame up the wing over the plan upside-down, one panel at a time.

Place one aileron servo in each wing panel, then glue the 1/8-inch-ply servo mount and servo-mount support into place. Each wing panel contains five shear webs, which are made from 1/16x3x24-inch balsa sheet. The LEs are preshaped and must be cut apart before you glue them into place. Be sure to align all of the spars, LE and TE parts with the wing centerline before you glue them.

RETRACT INSTALLATION

The Hobbico main-gear retracts are very easy to install in the wing panels. Cut the gear legs to the length shown in the manual and attach Great Planes adjustable axles to the legs along with 2-inch wheels. Screw the completed unit to the basswood retract rails that are glued into the notches in the gear ribs. The plan shows a full-size template for bending the retract pushrods, which are made from two 12-inch Great Planes pushrods.

Attach the pushrod to the retract and make certain that nothing binds it or restricts its operation. Remove the retract from the wing panel, and glue the bottom LE and TE sheeting into place with thick CA. Unpin the wing panel and very carefully cut openings in the LE sheeting to accept the retract body. Lay the retract on the rails, draw around the wheel and gear leg with a pencil and carefully cut away the sheeting so that the unit fits in nicely; make sure there is ample clearance so the wheel and gear leg do not bind during operation.



Here, the wing has been framed, and the retracts have been installed. Note the wheel wells; the instructions show how to make these by wrapping 1/32-inch ply around a soda can, then sanding them flush with the ribs on each side.

The instructions show how to make a wheel well out of 1/32-inch ply wrapped around a soft-drink can. Center the wheel well around the wheel and glue it to the LE sheeting, spars and LE. Remove the retract again and trim the sheet flush with the inside of the wheel well, then block-sand the top of the wheel well so it's flush with the ribs on each side of it. That's it! It isn't much more work than installing fixed gear, and it's well worth the extra time.

Join the framed-up wing panels with a wing joiner that is laminated together from three 1/8-inch-ply die-cut pieces. Two wingtip jigs and a center-joint jig help keep the panel straight while the epoxy dries on the center joint. With the wing still on the jigs, glue the retract servo mount, the top sheeting and the capstrips into place. This will result in a perfectly straight wing.

When all of the sheeting has been trimmed, glue the forward dowel support into place with the two dowels. The ailerons, aileron-tip and aileron-center pieces are made from tapered aileron stock. Cap the wingtips with leftover 1/16-inch balsa sheet. Glue the aileron-center and aileron-tip pieces into place, and cut the ailerons so there is about 3/32-inch clearance on each end. Hinge the ailerons without gluing, and sand the entire wing smooth. The wing goes together very quickly; it probably took me less time to build it than to write about it.

FUSELAGE

The fuselage is constructed primarily of 1/8-inch die-cut lite-ply formers and 1/8-inch die-cut balsa. The top front and turtle deck are formed with 1/8x1/4-inch stringers.

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

After starting the engine, I taxied the Tracer out to the runway and checked the ground handling. Even with its low ground clearance, the Tracer maneuvered very well with no tendency to nose over in tall grass. I pointed the model into the wind, and it was airborne before I reached full throttle. I didn't even need any trim corrections when I retracted the landing gear.

When I landed the plane, it slowed to a crawl with no sign of sluggish control. As a matter of fact, I was so impressed with how it flew at landing speed that I nearly forgot to put the gear down.

• LOW-SPEED PERFORMANCE

The Tracer exhibits exceptional low-speed performance. When the wings are level, you can chop the throttle and nose the airplane up, and it will stop and fall nose-down without snap rolling. At 1/4 throttle, the airplane will still do rolls and loops and will fly inverted. It probably flies better at low throttle than some 60-size pattern ships do at full throttle.

• HIGH-SPEED PERFORMANCE

I was really impressed with the Tracer's speed. With the O.S. FX .46 swinging an 11x6 prop, the Tracer is a real bullet in the air. It retains its nice, stable flight characteristics.

• AEROBATICS

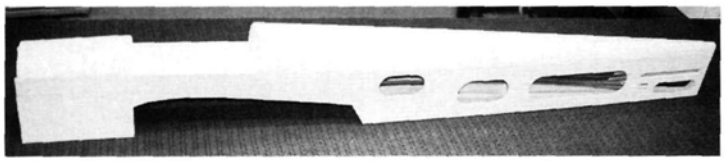
The Tracer is designed to perform aerobatics. In the hands of a capable pilot, it would be competitive in almost any pattern contest.

The Tracer tracks straight through inside and outside loops, and it's barely affected by a crosswind. Rolls do not require much elevator input, and snap rolls are very crisp. The Tracer also stops the roll wherever you center the sticks. The airplane is so clean that to do a stall turn, you must throttle down way in advance of pulling up; it then climbs like a rocket before it bleeds off airspeed.

The first step is to put together the subassemblies. Glue the two formers together to make up the firewall. An ⅛-inch-ply plate glued to the back of the firewall holds the blind nuts for the motor mount. Stamp punch marks on the front of the firewall to indicate where the mounting screws, fuel lines and throttle cable holes go. The fuselage sides are made from three die-stamp pieces; the top is made from two die-stamp pieces. This is where I ran into some difficulty.

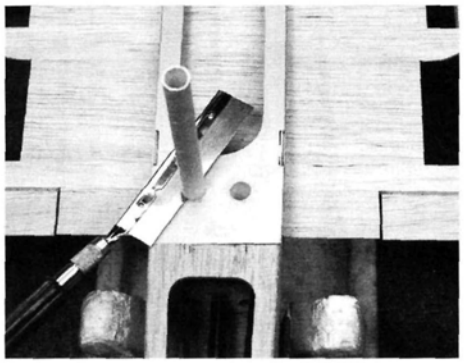
The die-cut pieces did not fit together properly, and it took some time to get the pieces to match the blueprint. In addition, the sheets of balsa that the parts were stamped from varied in thickness, and this created extra work when it came time to fit and sand the bulkheads.

After you glue the fuselage sides together, glue ⅛-inch plywood doublers into place to form a left and a right side. The doublers run from the front of the fuselage to behind the TE. The fuselage doublers have slots



The fuselage is constructed mainly of ⅛-inch, die-cut, lite-ply formers and ⅛-inch die-cut balsa.

of different sizes stamped into them that help to locate the firewall with the proper amount of right thrust. Be sure to glue the doublers to the proper fuselage sides.



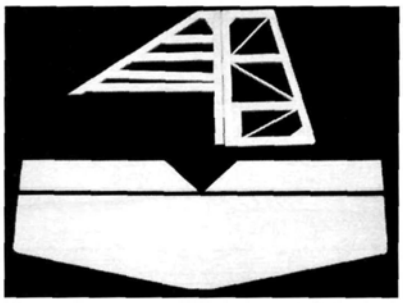
To make it easier to screw the wing hold-down screws into place, I installed cardboard tubes to act as guides.

Glue the bulkheads into the notches in the top of the fuselage. Use a square to hold the bulkheads 90 degrees to the top of the fuselage when you glue them. Now, glue the sides of the fuselage to the top and to the bulkheads; use the notches in the top to properly align the sides with the bulkheads. Next, glue the fuselage bottom into place.

When I unpinned the fuselage from the workbench, I noticed that the top was not as wide as the sides. This left me with a gap around the fuselage of about 1/64x⅛ inch that had to be filled in after I had sheeted the turtle deck and fuselage top.

Following the plans, mount the wing to the fuselage and glue a belly pan to the bottom of the wing. The rest of the fuselage is pretty much straightforward. Sub-bulkheads and stringers that are sheeted with 3/36-inch balsa form the top shape of the fuselage.

Sand the fuselage one final time, then bolt on the wing and glue the stabilizer and fin into place. As long as you follow the instructions, everything will come out straight, and you will have an airplane that requires no trim and that tracks straight through every maneuver.



Secure the framework of the tail feathers with drops of thin CA. If you sand the fin and rudder at the same time, you'll ensure that they are the same thickness.

ENGINE AND COWL

I chose the recommended O.S. .46 FX for my Tracer; it proved to be the perfect powerplant. I attached the supplied mount to the firewall with the supplied 6-32 screws and adjusted it to fit my engine. I used my Great Planes Dead Center Engine Mount Hole Locator to mark the location of the holes, then drilled and tapped the mount to accept 6-32 socket-head bolts.

The cowl is vacuum-formed ABS plastic and must be cut along the provided lines. Glue the cowl halves together with thin CA and reinforce the inside joint with scraped ABS sheet. The engineers at Great Planes provide cut lines molded into the cowl sides, and these make it much easier to locate all the cowl openings (provided you are using the O.S. .46 FX engine). Scribed lines indicate where you should cut the exhaust exit, air intake, glow-plug hole and even the wrench holes for access to the muffler screws. Four sheet-metal screws hold the cowl on the fuselage.

RADIO INSTALLATION

The die-cut plywood servo tray fits a variety of servos. Mount the aileron servos in the left and right wing panels then feed the servo wires through the hole in the top center section. Connect the ailerons to the servo arms with the provided control horns and the pushrod wire. Screw the Hobbico low-profile retract servo into its built-in tray and connect it to the pushrod with the provided screw-lock connectors.

Drill holes through the bulkheads and fuselage to guide the elevator, throttle, rudder and antenna through the fuselage then glue them into place. This makes setting up the pushrod wires very simple and bind-free. After the pushrod tubes have been glued in, epoxy the ⅛-inch-ply servo tray into place. The control surfaces are connected to the servos with the supplied 1/16-inch pushrod wire. Fast-link connectors secure the pushrod wires to the servo arms, and the throttle connection uses a screw-lock connector.

BALANCING

It is very important to balance the model—not only on the correct center of gravity but also laterally. I had to add 6 ounces of lead to the rear of the fuselage to achieve the balance shown on the plan; the lateral balance was fine.

COVERING AND PAINTING

I chose to cover my model with Top Flite MonoKote. When I had finished covering the model, I installed the supplied CA hinges. I trimmed the canopy to the cut lines and glued it into place. Remember to remove the covering materials around the canopy area where you want the glue to stick. I used slow-curing epoxy to hold my canopy in place and secured it with low-tack drafting tape until the glue had dried.

I painted the canopy with Top Flite LusterKote to match the trim scheme.

CONCLUSION

Even though the review kit required some extra work, it was well worth it. The Tracer is one of the sweetest flying airplanes that I own, and I know that anyone who builds one will be thoroughly pleased. Keep up the good work, Great Planes! ✈

Futaba Corp. of America; *distributed by Great Planes Model Distributors Co.*

Great Planes Model Mfg. Co., *P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.*

Hobbico; *distributed by Great Planes.*

Master Airscrew; *distributed by Windsor Propeller Co., P.O. Box 250, Rancho Cordova, CA 95741; (916) 631-8385; fax (916) 631-8386; www.masterairscrew.com*

O.S.; *distributed by Great Planes.*

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MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

THE WORLD MODELS

FAIRCHILD PT-26

A classic favorite in ARF form

by Bob Van Tassel

The PT-26 Fairchild is a highly recognizable and popular variant of the classic PT-19 primary trainer. Its distinct look and excellent flight characteristics make it a favorite among pilots of both full-size and model aircraft. Until now, if you wanted a model of the PT-26, you had to build it yourself. Now, thanks to The World Models Mfg. Co. and its U.S. distributor, AirBorne Models, you can have a 40-size version of this plane in the air in no time.

The 57.5-inch-span Fairchild features top-quality balsa and plywood construction and includes all the necessary hardware and accessories. The model includes a dummy cowl to aid engine installation; the real cowl is fiberglass and nicely painted. The plane comes with its iron-on covering expertly applied, and a provided set of fuelproof decals completes the scale look. Painted pilot figures are even provided to dress up the cockpit, and the kit comes with a nice, polished-aluminum spinner. World took some liberties by equipping the Fairchild with retracts, but they come already installed, and I think that extra detail just adds to the fun.

ASSEMBLY

I enjoy building, but it's hard to compete with the excitement of opening a box containing a well-constructed, beautifully finished airplane such as this. I also have to be honest with myself and admit that I would spend many hours in the shop and probably still not be able to compete with the quality of this airplane. I found no wrinkles in the covering; the hinges are all pre-installed and glued; the covering has been removed in the areas of the tail feathers where glue is to be applied. The manual does lack a little detail in areas such as where to apply decals. This should not be a problem as long as you don't throw away the box; the pictures show the decal locations.

The first steps in the manual detail the installation of aileron hinges and retracts, but both of these are already done for you. All that is left to do is to attach the two yellow landing-gear panels by snapping the brass clips over the landing-gear wire and installing two 4mm screws. A drop of CA secures the assembly.

Next, I removed the covering where the aileron servos were to be installed; I used Futaba 3003 servos. The servos are attached to two balsa panels and secured to the wings with eight, 2x12mm screws. Monofilament drawstrings had been installed in the wings to pull the servo leads to the center section, and two holes were predrilled in the top

As you can see, The World Models Fairchild PT-26 ARF comes beautifully covered and includes lots of hardware and scale details. Notice the painted pilots and the preinstalled hinges.

PHOTOS BY BOB VAN TASSEL AND WALTER SIDAS

SPECIFICATIONS

Model: Fairchild PT-26

Type: sport-scale ARF

Manufacturer: The World Models Mfg. Co., Ltd.

Distributor: AirBorne Models

Wingspan: 57½ in.

Wing area: 533 sq. in.

Weight: 5½ lb.

Wing loading: 23.8 oz. per sq. ft.

Engine req'd: .32 to .40 2-stroke; .52 to .70 4-stroke

Engine used: O.S. .52 4-stroke

Prop: Master Airscrew 11x6

Radio req'd: 5-channel; 6 servos

Radio used: Futaba T6XA

Price: $169.99

Features: good-quality materials and construction; iron-on covering, installed retracts, dummy cowl to aid engine installation, painted fiberglass cowl.

Comments: the world of ARFs is advancing as quickly as the world of computers, and World Models is on the cutting edge of technology. This plane is, without a doubt, the most complete and easy-to-assemble ARF that I have constructed. Add to that the way the PT-26 flies, and I believe you will agree that this model is a winner.

Hits
- Quick to assemble.
- Good-quality materials with replacements easily available.
- Excellent flight performance.
- Dummy cowl aids engine installation.

Miss
- Assembly manual is a bit vague in places.

The PT-26 comes with its retractable gear already installed. Sure, this isn't exactly scale, but they look neat, work well, and all the hard work has already been done for you.

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

I ran a tank of fuel through my new O.S. .52 4-stroke to break it in and check for overheating, which proved not to be problem. My test pilot, Jim Onorato, turned the plane into a very light breeze, slowly advancing the throttle to full. On the grass field, the plane accelerated slowly until, at about 200 feet out and with no rudder input, it gently lifted off. The climbout was equally gentle and smooth.

We checked the stall by taking it up high and reducing power. With full up-elevator reducing forward speed to a crawl, the plane stalls gently by dropping its right wing until it picks up some speed and starts flying again. Flying the landing pattern is just a matter of reducing the throttle, lining up with the runway and settling it in on the mains.

• LOW-SPEED PERFORMANCE

Being a replica of a trainer, the Fairchild excels at slow-speed handling, and there is plenty of time to make corrections. This will make an excellent low-wing aileron trainer; it is rock solid and very gentle.

• HIGH-SPEED PERFORMANCE

This is not a high-speed plane; you won't be racing with it. With the wheels retracted, however, it flies at a very respectable speed.

• AEROBATICS

The PT-26 is capable of aerobatics. Inverted flight requires some down-elevator. At low-rate ailerons, it requires correction during rolls. At high-rate ailerons, the rolls are very axial. Loops at high-rate elevator produce a fall-off at the top of the loop. Spins are great, with no correction needed when coming out.

center section. I just cut the covering and routed the servo leads up through them. I joined the wings using the dihedral brace and 5-minute epoxy. They fit perfectly and only required a few strips of masking tape to hold them together while the epoxy dried. Next, I installed the retract servo with the servo arm toward the rear. (A dedicated retract servo is a must for clearance.) This required a few tries to get it aligned; I suggest that you connect the servo to your radio and check out its movement, and position the servo arm the way you want it before final assembly. The whole wing assembly took about two hours, including the time I spent on the wheel retracts.

It's the little details that make this ARF really stand out. Check out the polished aluminum spinner and supplied torque rod.

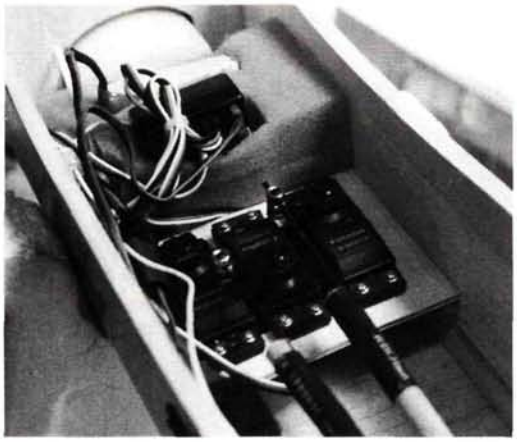
To assemble the tail, simply remove the filler blocks from the fuselage (this nice touch holds the correct spacing during covering). The hinges are all preglued, and the covering had been removed in the areas to be glued. I aligned the tail feathers and epoxied them into place. The rudder is sheet balsa with dummy ribs. Attach the tailwheel to the rear of the fuselage, and insert the tiller arm into the underside of the rudder to complete the assembly of the tail feathers.

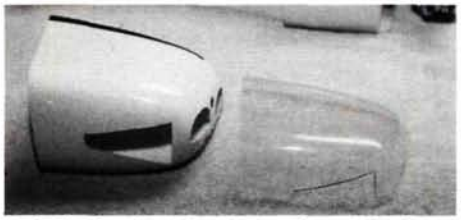
I installed the supplied 320cc tank using three lines: one fill line, one pressure line to the exhaust and one line to the carburetor. I used blue tubing for the carburetor and red for the pressure line. I use this color-coding to avoid mixing up the lines at the field. Red reminds me of "hot," so I use it for the exhaust.

The instructions show an upright engine installation with the cylinder head extending through the top of the cowl. After measuring, I determined that I could install my O.S. .52 4-stroke engine inverted and minimize the amount of cowl cutting required; this makes a cleaner installation. I installed the engine with proper clearance for the supplied spinner and prop. Using the dummy cowl as a template, I made the necessary cuts. I mounted the cowl using four 3x12mm screws. I used fuel tubing in the holes in the fuselage where the cowl screws are attached; this minimizes vibration and makes installation easier. I built the pushrods per the manual and installed the three servos in the fuselage. I attached the

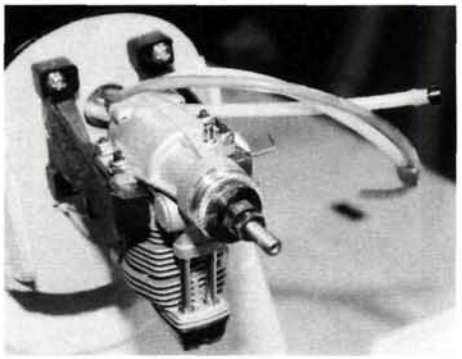
pushrods to the servo arms with a piece of hardware called a "linkage stopper." The battery and receiver are inserted into a piece of foam rubber (supplied) that has been cut specifically to accept them.

The elevator and rudder are connected to the pushrods in the usual manner. Mounting the wing on the fuselage requires the use of two 4x33mm screws. The holes are predrilled in the wing, and I attached a reinforcement piece to the wing's underside trailing edge. The wing's forward





Left: the fuselage has plenty of room for the radio. I used a Futaba receiver and servos; notice the shaped foam block that is provided to protect your receiver. Above: the painted fiberglass cowl is a nice piece, and the supplied dummy cowl ensures that it stays nice by helping you make clean, precise cuts for your engine openings. Below: the O.S. .52 4-stroke sounds great and fits the character of this plane. To cut the cowl as little as possible, I mounted the engine upside-down.



section is attached to the fuselage with a plug.

I mounted the prepainted, supplied pilots in the plastic cockpit pan that I attached to the fuselage, and then I attached the prepainted canopy to the fuselage using eight, 2x8mm screws. I used double-sided, clear tape along the bottom edge of the canopy for a tight fit. I assembled the plane and checked all of the surfaces for proper alignment. This completed the basic assembly.

CONCLUSION

The finish on this plane is first-rate and it has a nice scale look, even with the retracts. The flight characteristics are just what you'd expect of a model of a low-wing trainer—very smooth and stable. It is quick to build, and lots of details have been completed for you. Want to assemble a plane in jiffy time and be at the field with a really fun Sunday flyer that you will be proud of? Pick up the World Models PT-26.

AirBorne Models, *2127-H S. Vasco Rd., Livermore, CA 94550; (925) 371-0922; fax (925) 371-0923; www.airborne-models.com.*

Futaba Corp. of America; *distributed by Great Planes; www.futaba-rc.com.*

Great Planes Model Distributors Co., *P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.*

Master Airscrew; *distributed by Windsor Propeller Co., P.O. Box 250, Rancho Cordova, CA 95741; (916) 631-8385; fax (916) 631-8386; www.masterairscrew.com.*

O.S.; *distributed by Great Planes; www.osengines.com.*

The World Models Mfg. Co. Ltd., *distributed in the USA by AirBorne Models of Kowloon Bay, Hong Kong; www.theworldmodels.com.*

WattAge Impress

by Bob Aberle

Electric sport plane for intermediate pilots

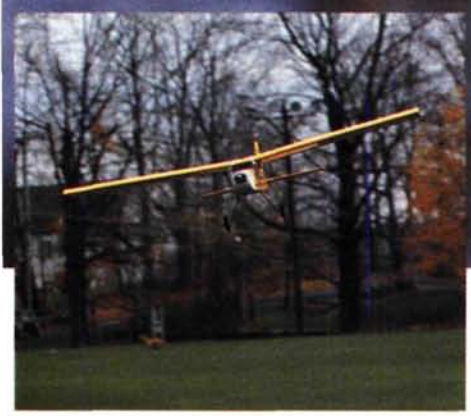
Sport fliers who are ready to transition to a model that has aileron control will appreciate the WattAge Impress. This built-up balsa and ply almost-ready-to-fly (ARF) model requires little assembly time; the aileron and elevator control surfaces come hinged, and the electric motor comes already mounted on a neat, clamshell-type metal mount. You only need to join the wing halves, install the aileron servo and control linkage, cement the stab and the fixed rudder, install the prebent landing-gear struts and wheels, and hook up the elevator servo and control rod.

PHOTOS BY BOB ABERLE & WALTER SIDAS

The RS-380 motor comes with a 7.2V winding and a sturdy gear train with a reduction ratio of 1.7:1. The in-depth instruction manual that comes with the Impress is exceptional and includes outstanding photos and sketches. All of the accessory parts are identified in photos to eliminate any chance of confusion in the final assembly process. The manual even includes a section on breaking in the motor using motor cleaner and a lightweight oil. A word of caution: the manual is written for both the Impress and Ezette designs. Throughout, you will note that it tends to jump between the two aircraft. Stay alert!

I don't think it is necessary to go through the few assembly steps it takes to complete the Impress; anyone who has assembled an ARF shouldn't have any trouble assembling it. Instead, I will hit on some highlights and offer a few suggestions that will make this excellent design even better. First of all, the motor comes wired with red and black cables, which you need to attach to the red and black wires on your electronic speed control (ESC). I assembled my motor, ESC and battery and hooked them up to my receiver, turned on the throttle and found that my prop was turning

The WattAge Impress comes fully constructed of balsa and covered with a yellow iron-on material. The motor and control-surface hinges are factory-installed, so very little assembly is required.



backward (clockwise). Remember that prop-shaft rotation should be reversed (counterclockwise) when you use a gearbox! Because I was using Sermos connectors, I only had to reverse the motor cable wires. Had I not realized this, I could have easily damaged the plane on the first hand launch.

Standard-size Hitec HS-300 servos for the ailerons and elevator fit perfectly into the provided plywood servo-mounting trays. Note that there is plenty of room on the fuselage servo tray for a second servo for added rudder control, if you like. Adding rudder control might provide more ground maneuverability to help the model take off from the ground.

I also used a Hitec Flash 5X transmitter and a Hitec 555 dual-conversion, 0.6-ounce micro receiver attached to the central fuselage floor with hook-and-loop fastener. A small extension cable makes it easier to attach the aileron servo to the receiver (remember that you have to remove the wing to access the bat-

SPECIFICATIONS

Model: Impress

Manufacturer: WattAge

Distributor: Global Hobby Dist.

Type: electric ARF sport/trainer

Wingspan: 44 in.

Wing area: 310 sq. in.

Weight: 26.6 oz. (w/HS-55 servos and 1200 NiMH pack)

Motor: RS-380 geared 1.7:1 (included)

Prop: 7¾x6 plastic (included)

Speed controller: Gordon Tarling Micro Star 20 BEC/B

Motor current: 8.8 amps

Battery recommended: 7-cell 600mAh Ni-Cd, or 8-cell 800mAh NiMH

Battery used: 8-cell 1200mAh NiMH

Flight duration at full throttle: close to 8 minutes on 1200 NiMH pack

Channels req'd: 3 (ESC, aileron, elevator)

Radio used: Hitec Flash 5X transmitter, Hitec 555 micro dual-conversion receiver, two Hitec HS-55 sub-microservos

Street price: $99.99

HITS

- Excellent assembly and flight instruction manual.
- High-quality workmanship.
- Quick assembly time.
- Very easy to fly.

MISS

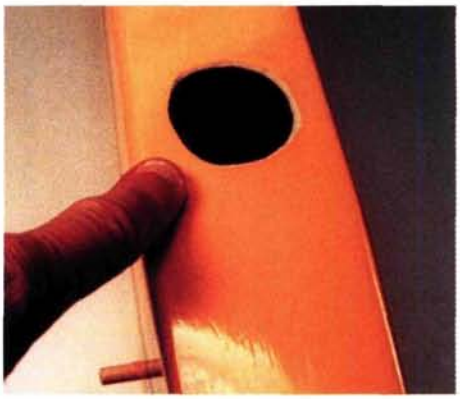
- No provision made to air-cool motor or battery.

The RS-380 geared motor comes installed on the mount. The manual includes instructions for motor break-in; you need only motor cleaner and lightweight oil.

A Hitec HS-300 servo is used to operate the elevator. There is plenty of room for the receiver and battery; you could also add another servo for rudder control.

tery). For the ESC, I used a Gordon Tarling Micro-Star 20 BEC/B, which can handle 6 to 8 cells at up to 20 amps. This isn't the lightest unit available, but it is very reliable and has an arming switch. I attached the ESC to one of the fuselage sides with hook-and-loop fastener.

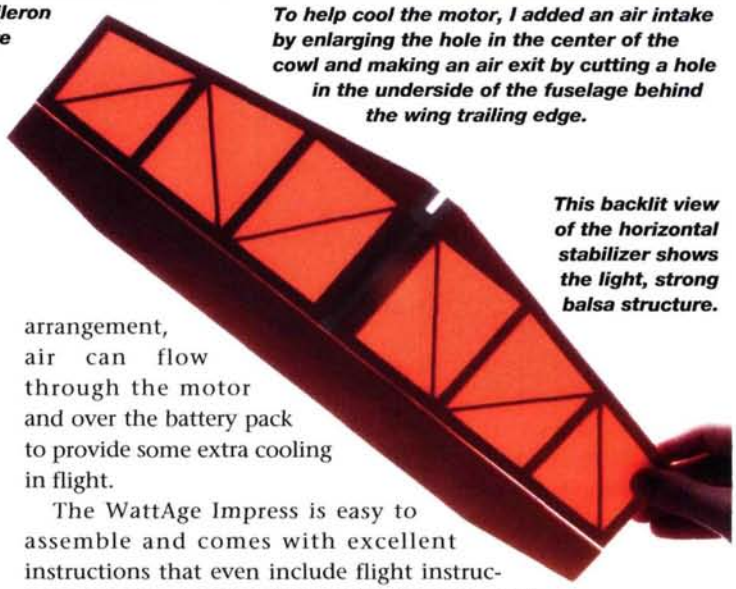
A Hitec HS-300 servo is used for the aileron control. The plywood tray and hardware are supplied.



To help cool the motor, I added an air intake by enlarging the hole in the center of the cowl and making an air exit by cutting a hole in the underside of the fuselage behind the wing trailing edge.

WattAge recommends that you use an 8-cell, 800mAh NiMH battery pack for up to 5-minute flights. Taking this idea one step further, I made an 8-cell, 1200mAh NiMH pack and substituted two Hitec sub-micro HS-55 servos for the larger servos. This easily extended the motor run to almost 8 minutes at full throttle. What an improvement! If you use this heavier battery pack, be sure to check the CG location.

Landing-gear strut wires are provided, along with very functional soft sponge wheels and wheel collars. The vacuum-formed plastic cowl is held in place with four small sheet-metal screws. Because the cowl doesn't have an air intake to help cool the motor, I opened up the front of it with a Dremel drum sander and added an air exit hole underneath the fuselage toward the rear. With this arrangement, air can flow through the motor and over the battery pack to provide some extra cooling in flight.



This backlit view of the horizontal stabilizer shows the light, strong balsa structure.

The only "major" assembly is to cement the wing halves together. Note the tape that holds the joint together while the cement cures.

The WattAge Impress is easy to assemble and comes with excellent instructions that even include flight instruction. I have nothing but praise for this well-thought-out, high-quality, electric design.

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

Because it doesn't have rudder control, it's best to hand-launch the Impress. You may need a helper for the first flight, but it's easy to launch the plane with one hand while you hold the transmitter in your other hand. On landing, the Impress can really be slowed down, without any tendency to stall.

• GENERAL FLIGHT CHARACTERISTICS

The Impress can quickly gain a lot of altitude, and flying is very positive with the controls set up according to the instructions (both aileron and elevator set at 5/16 inch on either side of neutral). Most general maneuvers, such as rolls, loops, Cuban-8s, stall turns and inverted flight, are easy to perform. What can I say? The Impress is impressive! Substituting the 8-cell NiMH pack added considerably to the model's flight time and my overall enjoyment.

Global Hobby Distributors, *18480 Bandilier Cir., Fountain Valley, CA 92708; (714) 963-0133; fax (714) 962-6452; www.globalhobby.com.*
Gordon Tarling; *distributed by Modelair-Tech.*
Hitec RCD Inc., *12115 Paine St., Poway, CA 92064; (858) 748-6948; fax (858) 748-1767; www.hitecrcd.com.*
Modelair-Tech, *P.O. Box 1467, Lake Grove, NY 11755-0867; (631) 981-0372; www.modelairtech.com.*
Sermos R/C Snap Connectors Inc., *Cedar Corners Station, Box 16787, Stamford, CT 06905; phone/fax (203) 322-6294.*
WattAge; *distributed. by Global Hobby Distributors.*

Remington-Burnelli RB-2 Transport

by Alan Heim

A unique twin-engine biplane with a lift-generating fuselage

I started to think about building a model of the Remington-Burnelli RB-2 almost 20 years ago. Knowing of my love of airplanes, my sister-in-law gave me an old 8x10 photo of an unusual twin-engine biplane from the 1920s. At the time, I had no idea what it was; the information on the photo read "Remington-Burnelli Transport," and it was dated October 26, 1925. Two pilots sat side by side in the propwash. I didn't have the remotest idea of how very special and completely different the Remington-Burnelli RB-2 really was. When I decided to build a model of the plane, I wrote to the Archives Division of the Smithsonian Institution, which sent me a package of newspaper articles and other documents from which I was able to draw up the plan. If you like biplanes, and a twin-engine at that, this very gentle sport-scale subject is well worth your modeling effort.

SPECIFICATIONS

Model: Remington-Burnelli RB-2 Transport

Type: 1/12-sport-scale biplane

Wingspan: 76 in. (with ailerons)

Wing area: 1,300 sq. in. (wings only)

Effective wing area: 1,950 sq. in. (conservative estimate with 1/3 of fuselage-generated lift)

Length: 44.5 in.

Weight: 9.5 lb.

Wing loading: 16.8 oz./sq. ft.

Effective wing loading: 11.22 oz./sq. ft. (with fuselage-generated lift)

Engines used: 2 K&B .45 Sportsters

Prop used: 11x7.5

Radio req'd: 4-channel w/5 servos (2 for aileron, 1 each for elevator, throttle and rudder)

Comments: designed by Alan Heim, the plan was drawn from photos and 3-views from the Smithsonian Institution's Archives Division. The model has conventional built-up balsa and light plywood construction. Building took approximately 120 hours over six weeks.

FUSELAGE CONSTRUCTION

Cut out the plywood firewall, the fuselage doublers and sides and the pieces for the top, bottom and rear cabin support assembly. The firewall will be inserted into a 1/4x2 1/2-inch notch that's formed between the nose former and the main side fuselage doubler. Assemble and epoxy together the support structure pieces and when the glue has set, epoxy the firewall and the four nose formers into place. Now add the two vertical ply strips—one on each side, fore and aft of the forward large windows—then glue the entire substructure to the fuselage sides, making sure that all the parts line up properly and that the fuselage is straight and true. Use plenty of clamps.

Add the 1/8x2 1/8-inch former sheet, and install the remaining cross-braces throughout the fuselage. Cut to shape, and then temporarily fit the horizontal stabilizer and the two vertical stabilizers into place. Prepare the tailskid base assembly and the 1/8-inch-ply cross-piece support. Drill four holes in the base and install the 6-32 blind nuts before you glue the base into place. Fabricate the tailskid assembly using the 1/4-inch ply base, a 5/16-inch dowel skid, four 3/8-inch steel springs (from a hardware store) and four 1-inch-long 6-32 screws (see the plan for details).

Assemble the servo mounts, and prepare them to be installed later. To hold the fuel tanks in position, I used scrap balsa and 1/4-inch brass strips screwed to each side of the firewall. Mark the positions of and then drill the holes in the fuselage sides and formers and in the support pieces for the elevator and rudder pushrods; then add the 1/4-inch-sheet-balsa nosepiece.

Start building the fuselage by assembling the internal doublers and stiffeners as shown here. Keep everything square.

Bend the bottom of the 3/32-inch piano-wire cabane struts to shape, and drill the top and bottom formers and insert the struts. Drill small holes through the fuselage sides in front of and behind each cabane strut, and bind the struts into place against the inner fuselage sides with thin loops of wire. Twist the wire ends together as tightly as you can, and then trim and solder them together. Glue each wire twist and the cabane wires to the fuselage with epoxy on the outside of the fuselage. Use filler to smooth the wire holes. Glue the horizontal stabilizer into place, and then sheet the top and bottom of the fuselage from nose to tail with 1/8-inch balsa. When the glue has dried, sand all the edges smooth and glue the vertical fins into place.

BUILDING WINGS

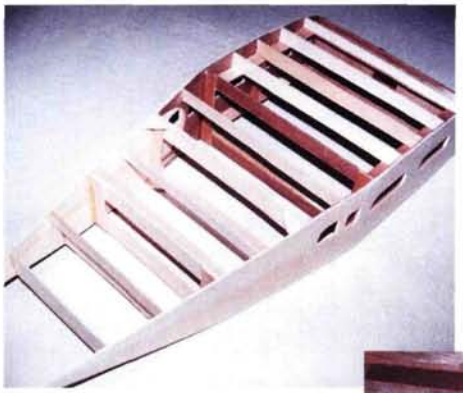
Cut and trim all the ribs for the 1/8-inch-sheet trailing edge (TE) and 5/16-inch-dowel leading edge (LE). Make 60 ribs out of 1/8-inch balsa, and make two ribs (for the lower wings) out of 1/16-inch ply. I used a band saw to cut 10 ribs at a time out of stacked wood.

Pin the spars on top of the protected plan, and then position and glue all the ribs to the three spars, enlarging the spar notches on the

PHOTOS BY ALAN HEIM

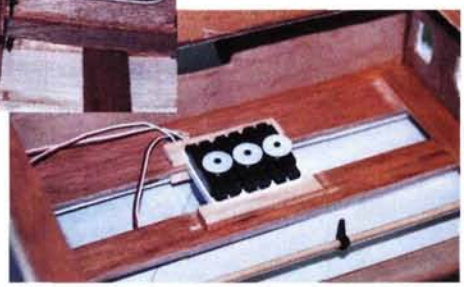
Four nose formers are glued to the front of the firewall; they strengthen the front of the fuselage.

Once the inner structure has been assembled, glue the balsa fuselage sides into place. Use clamps and rubber bands to make sure the glue joints are sound. Make sure the sides are straight and true before the glue has time to set.



Here, all the cross-pieces and stiffeners have been added to the fuselage.

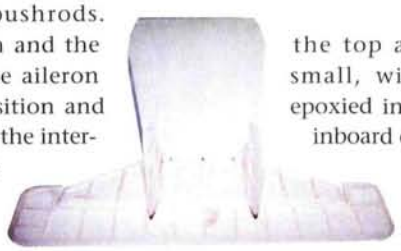
This close-up shows the cabane wires bound and glued to the inside surface of the fuselage side.



The servos are all but lost inside the cavernous fuselage. The dowel with servo arms glued to it is part of the throttle linkage. The servo is attached to the center arm, and short throttle pushrods are connected to the outboard arms to complete the setup.

center ribs as necessary. Add the ⅛-inch TE sheet, and install the hardwood-dowel LE with epoxy. Add the wingtips and mark the aileron outlines to cut later. Build up the wing and aileron hinge edges, and when you've completed these, cut the ailerons free of the wing. Finish the aileron tips (build up from balsa sheet) and bevel the hinged edges to allow free aileron movement. Add the landing-gear base pieces, and secure them with epoxy.

Add the center servo mount and the aileron bellcranks (as shown on the wing plan) and install the pushrods. Reinforce the control horn and the hinge areas, and hinge the aileron temporarily into place. Position and build up the hard points for the interplane struts. The struts are made of hard, 3/16x3/8-inch balsa and are simply inserted into ¼-inch-deep holes in the hard points built into the top and bottom wings (see wing detail on plan). The wings are held firmly against the interplane struts with rubber bands stretched between the top and bottom wing and are secured to the top and the bottom with small, wire-hook ends that I epoxied into the hard points just inboard of each strut. The no. 64 rubber bands next to the four struts are barely visible.



The completed tail parts glued into place on the fuselage. Note that the half ribs have been glued to the top of the stab and also to either side of the fins and rudders.

LANDING GEAR

Use one piece of 1/16x3/4x36-inch-long aluminum extrusion to bend and form the gear's main vertical support. The rear support is made out of thicker 1/16x1x36-inch aluminum extrusion, and the gear plates are made of 1/16-inch sheet aluminum. Cut, bend, drill and then rivet the U-shaped side plates into place. The side plates connect and secure the front and rear gear struts.

The metal-box covers that enclose the shock absorbers and stop plates are made of 1/32-inch sheet aluminum. Cut eight slots in the vertical supports for the axle, then drill and attach the gear permanently to the mounting; secure the attachment bolts with blind nuts. For each of the four shock-absorber housings, cut and install the ¼-inch-ply top supports. Insert the shock-absorbing material (a "Pink Pearl" pencil eraser cut in half lengthwise) between it and the side bracket. Position the metal covers over the shock absorbers, and drill a 1/16-inch hole through the cover, the top plywood support and the side plate. Tap the holes in the aluminum side plates, and then secure the covers with 4-40 screws. Drill an additional hole in the bottom of the housing and the bracket, and tap a 4-40 screw (see shock-box detail on plan). Install the one-piece axle wire and the 4½-inch balloon wheels; I used Williams Bros. wheels.

FINAL ASSEMBLY

Carefully remove the cutouts for the engines and fit the engines into place. Maintain at least a ¼-inch separation between the two propellers. I recommend 4 degrees of right thrust on the right engine and 2 degrees of left thrust on the left

FLIGHT PERFORMANCE

It took only one flight to confirm that I had built something very special. Each subsequent flight reconfirms this. I strongly recommend 2-stroke engines for this project because the landing-gear height and prop-to-prop clearance allow a maximum prop diameter of 11 inches. I chose to use K&B Sportster engines, as their head-bolt pattern is symmetrical, and you can rotate the head and piston 180 degrees to obtain opposing exhaust positions (right side right and left side left). They also come with remote needle valves.

I currently have 110 flights on the RB-2, and its control-surface settings are as follows:

Ailerons—½ inch up and down

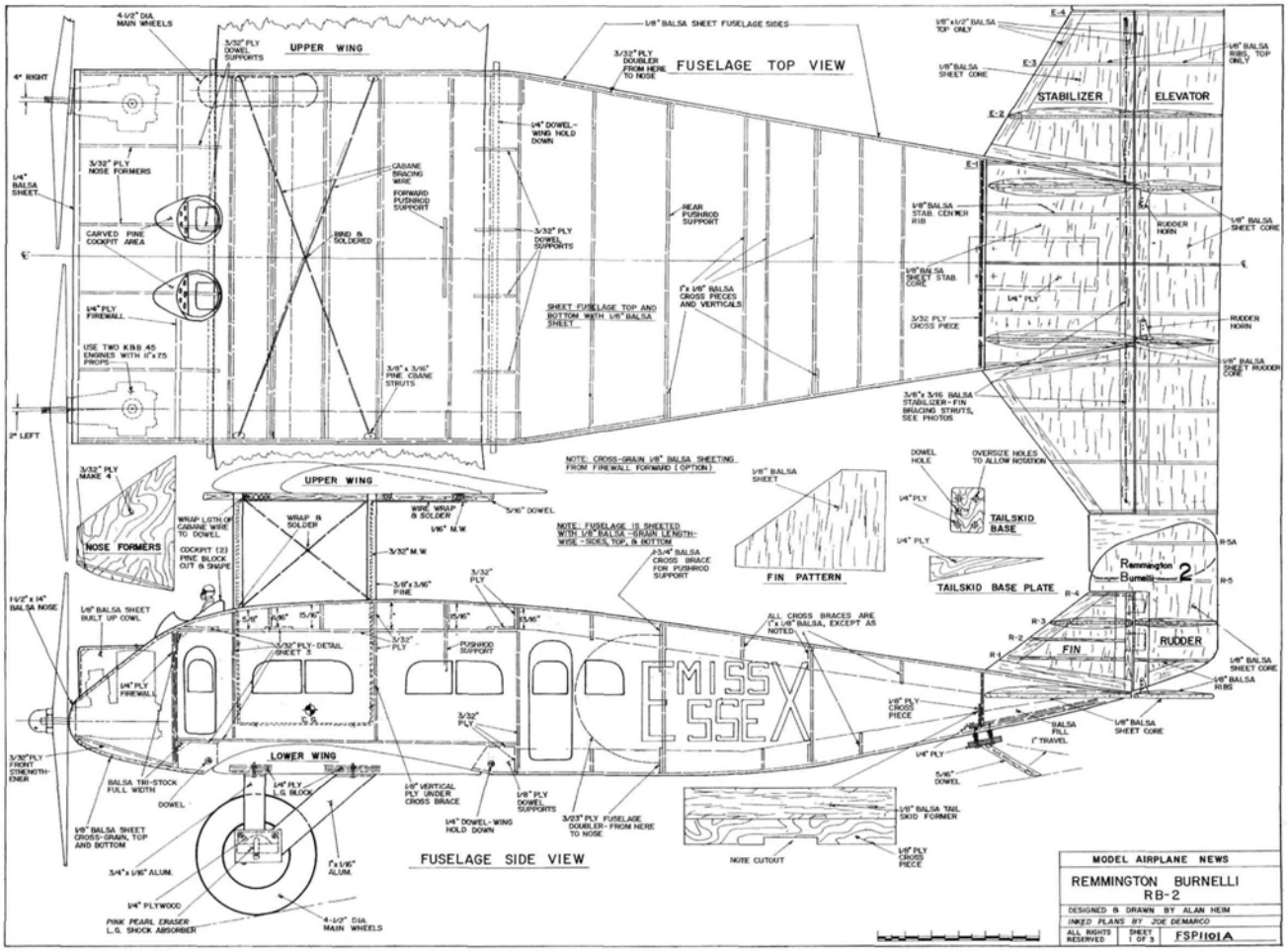
Elevator—½ inch up and down

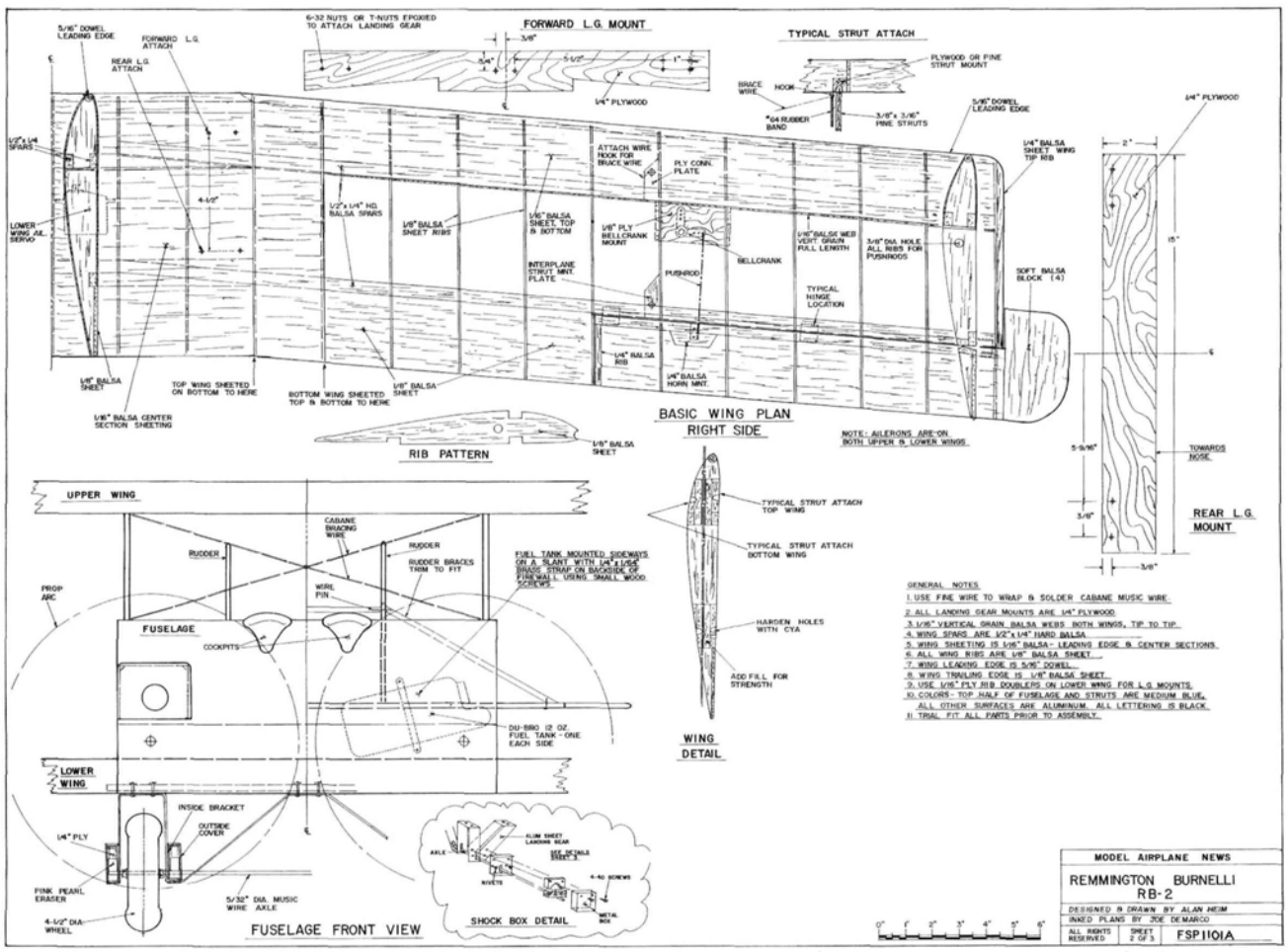
Rudders—slightly offset to the right with ¾ inch of throw in each direction

The model loops with ease, and I occasionally hot-dog the wings into a vertical position while I swing the model into the final approach; but take it easy for the first few flights. Tune the engines for synch at peak rpm with a mixture that's a little on the rich side, and let her roll. Keep it on the ground until you have plenty of speed, and then give a little up and maintain a gradual rate of climb. Keep your turns gentle, and when landing, reduce throttle to just above idle and float it back onto the turf. You will immediately see how gentle, deliberate and rather slow to respond the model is. I am amazed at how low the landing speed is, but this was to be expected of a Burnelli lifting body design!

When I use full throttle and one engine is out, the model will begin a very gentle turn into the dead engine. To correct this, I apply a little rudder toward the running engine. When making turns with one engine out, I hold the rudder steady and then turn with the ailerons and elevator (don't coordinate with the rudder).

REMINGTON-BURNELLI RB-2





To order the full-size plan, turn to RCStore.com on page 148.

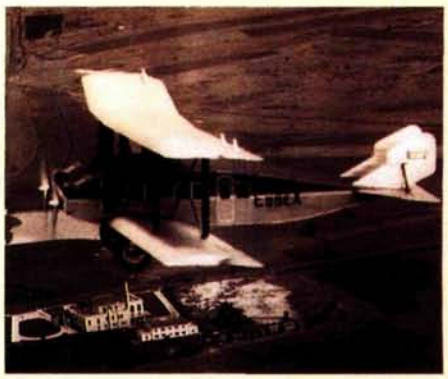
AHEAD OF ITS TIME

The Remington-Burnelli RB-2 was designed by Vincent J. Burnelli, who believed in the practical utility of a lifting-body aircraft design. Burnelli's ideas were well regarded among aeronautical experts of the day, and the basic principles are still employed, nearly 80 years later, in some of the most advanced experimental aircraft.

Produced in 1924, the RB-2 was a refinement of the earlier RB-1. Two Galloway Atlantic 500hp engines powered the RB-2, and they were mounted just far enough apart not to require staggered prop positions. The RB-2 had an 80-foot wingspan and 1,560 square feet of conventional wing area. By using an airfoil-shaped fuselage, however, the RB-2's fuselage produced nearly half of its total lift. This resulted in an improved payload capacity, a longer range and better low-speed performance. The RB-2 could carry 4,000-pound payloads with five hours of fuel aboard.

A byproduct of the fuselage's unusual shape was a dramatic increase in usable fuselage volume. Not only were more cubic feet available, but the cargo area was also more rectangular and, therefore, more practical. The Essex Car Co. used the plane in the photo (note the logo on the plane's side) as a flying showroom. A full-size sedan was on display inside, and there were a desk and chair for the salesman and chairs for the prospective buyers. For more photos of the RB-2, log on to www.aircrash.org/burnelli/ch_rb2.htm.

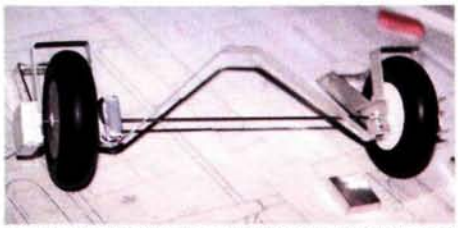
Of particular interest to modelers is the greatly improved low-speed performance of a lifting-body design. Since the fuselage itself



serves as a wing, the effective wing loading is substantially lower than that of a conventional airplane design. The original RB-2 had a landing speed of just 45mph—pretty good for a plane with a gross weight of 16,500 pounds!

engine. Before I installed the engines, I epoxied a 2½-inch-square, ¼-inch-thick plywood base to the firewall and sanded its face to give the desired engine downthrust for each engine. I then drilled holes through the bases and the firewall, installed 6-32 blind nuts and attached the engines using the supplied radial mount.

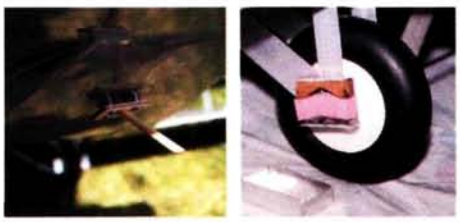
One servo throttles both engines. To do this, I installed a ¼-inch dowel crosswise inside the fuselage. I drilled out and shaped three old servo arms and slid them onto the dowel. I attached the servo pushrod to the center arm, and each of the throttle pushrods is connected to the respective outboard arms (details on the plans). Fit the arms tightly into position and epoxy them into place. Support the dowel at each end with ¼-inch ply plates that have holes drilled to mate with the dowel. Once the throttle linkage is in place, seal the inside of the engine housing with dope or alcohol-thinned epoxy.



The main landing gear is made of extruded aluminum, which is available from hardware stores. Slots cut in the gear guide the axle wire.

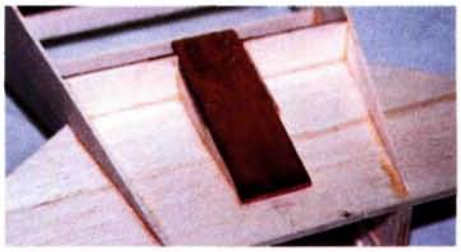
The completed model shown ready to cover. Note that the engines have their mufflers positioned pointing outward on each side.

Here's the completed fuselage with the cabane strut wires in place. Note the filler on the side sheeting. It fills the holes left after you bind the strut wires to the inside of the fuselage.



Left: the tailskid also absorbs shocks; details are shown on the plan. Right: this arrangement provides scale-looking shock-absorbing gear action. The pink rubber material between the top and bottom stops was cut from a "Pink Pearl" pencil eraser.

The vertical cabane-strut wire ends and the cross-diagonal brace wires must be wrapped with fine copper wire and soldered together. Then wrap the dowel wing support with fine wire and secure it to the cabane wires with epoxy. The points where the bracing wires cross should also be wrapped with a couple of turns of copper wire and soldered together. The top wing is attached to the support dowels with rubber bands. To protect the wing covering, I covered the tops of the support dowels with ¼-inch-wide strips of 1/16-inch-thick foam that I epoxied into place.



The tailskid reinforcement plate is installed before the bottom sheet is added to the fuselage.

I covered the model with metallic aluminum MonoKote and Coverite's 21st Century light blue. The lettering is black, and in 1925, aircraft registration numbers weren't used.

Finish the model with as much detail as you like, but don't forget to install the tail-bracing struts. I made mine from 3/16x3/8-inch hard balsa that I carved to an airfoil-shaped cross-section and glued into place; small wire pins strengthen the joints. I made the cockpit trim pieces by carving blocks of pine.

I hope you enjoy building and flying your RB-2 as much as I did. You'll love how it flies, and no one else will have one at the field.

Coverite; *distributed by Great Planes Model Distributors Co.*

Great Planes Model Distributors Co., *P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.*

K&B Model Products Inc., *P.O. Box 98, Sierra Madre, CA 91025; (626) 359-9527; fax (626) 301-0298; www.modelengine.com.*

MonoKote; *distributed by Great Planes Model Distributors Co.*

Williams Bros., *1119 Los Olivos Ave., Unit #3, Los Osos, CA 93402; (805) 534-1307; fax (805) 534-1366; www.williamsbrosinc.com.*

Leading and Trailing Edges

by Gerry Yarrish

Because so many people are getting started in the hobby by flying almost-ready-to-fly (ARF) models, they are learning basic model-building skills much later in the process of becoming pilots—usually, when their ARFs require repair! Learning how to make proper model structures is an important step toward building and flying more advanced and specialized airplanes. Strong wings are perhaps the most important part of a model's structure; along with the main spar, the leading and trailing edges (LEs and TEs) add much to the wing's strength. Making these smooth and fair also contributes to the model's aerodynamic efficiency. Here are some basic tips for building straight and true LEs and TEs.

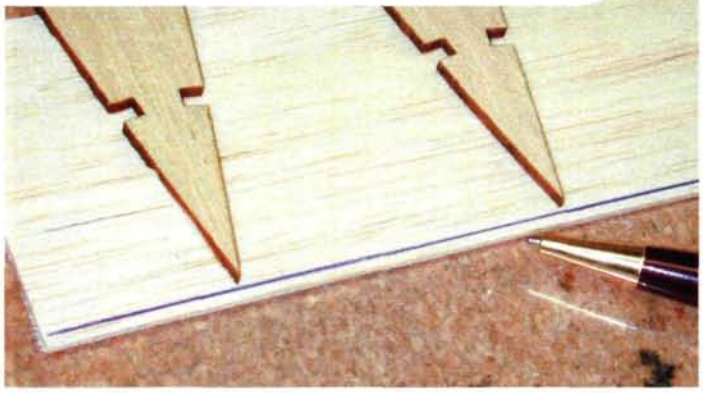
Make them straight, light and strong

PHOTOS BY GERRY YARRISH

1 The basic parts of any wing: ribs, sheeting and spars. You'll also need a sharp hobby knife, a metal straightedge, a razor plane, modeling T-pins, CA and kicker, aliphatic resin glue (Elmer's Carpenter's Wood glue) and a fine-tip applicator (optional).

2 If you're going to make straight TEs, then you have to start with straight-edge sheeting. Use your metal straightedge to cut the edges of the sheeting to remove any bow or curve.

3 Before you pin the wing structure to the building board, draw a line along the TE that's about 1½ times the sheet's thickness away from the edge (3/32 inch for 1/16-inch sheeting). This is where the ends of the ribs will line up so you can sand the sheeting flush with the rib's shape.

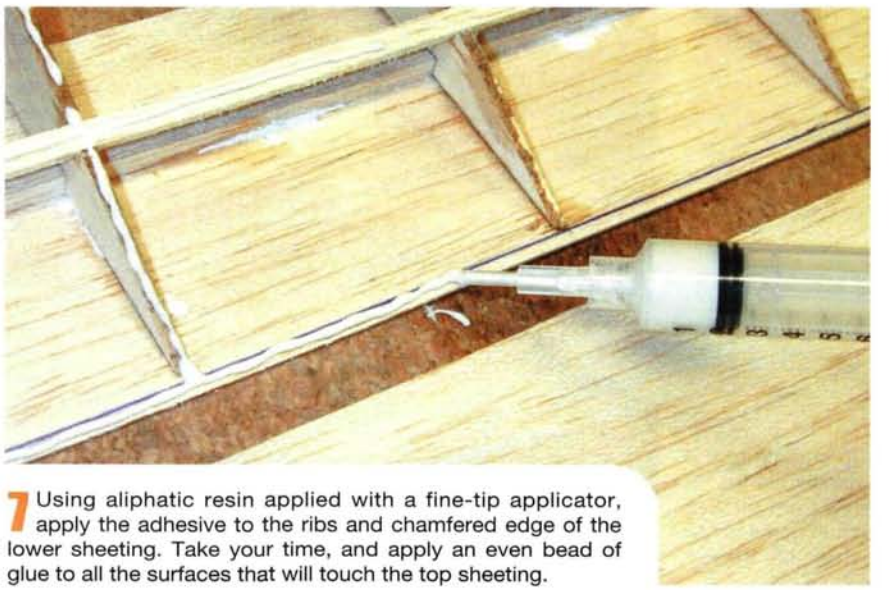


4 Using the ribs as a guide, pin the aft spar into place so the rib ends are aligned with the line you have drawn. If you're building a wing on a jib, adjust the sheeting so the line aligns with the rib ends.

Using CA and kicker, glue the lower aft spar and ribs to the lower TE sheeting then glue the upper rear spar to the ribs.

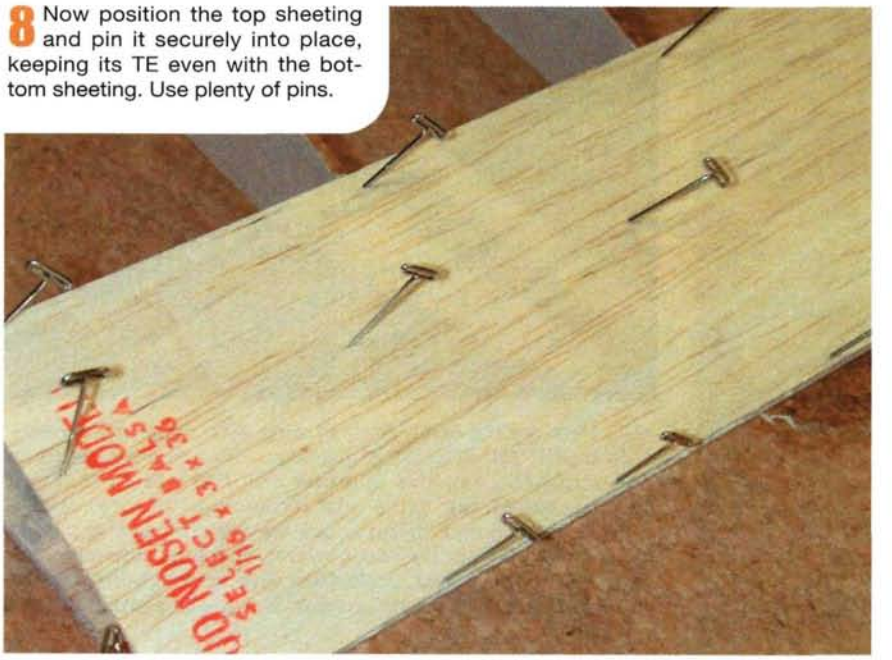
5 After the glue has set, use a long sanding block to sand the lower sheeting aft of the alignment line flush with the rib ends. This small chamfered edge gives the upper trailing edge some purchase for adequate glue bond. Try not to alter the ribs' contour when you sand.

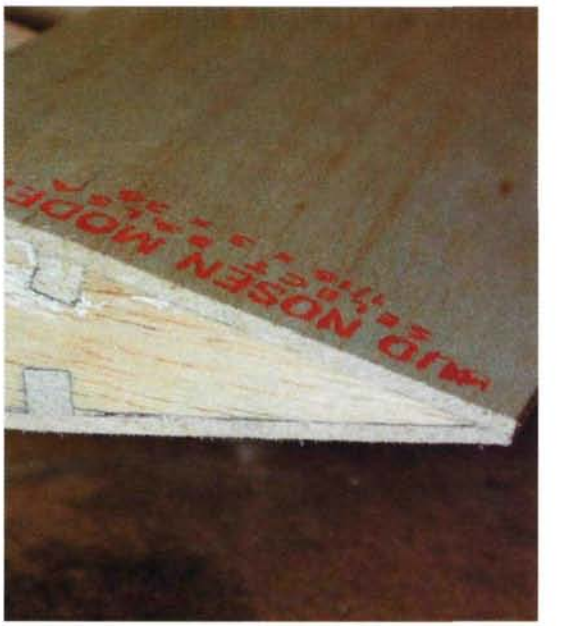
6 Place the top TE sheeting on top of the ribs, aligning its TE with the lower sheet's TE. Use a pen to mark the top sheet's LE on the ribs so you have a guide for applying the glue.



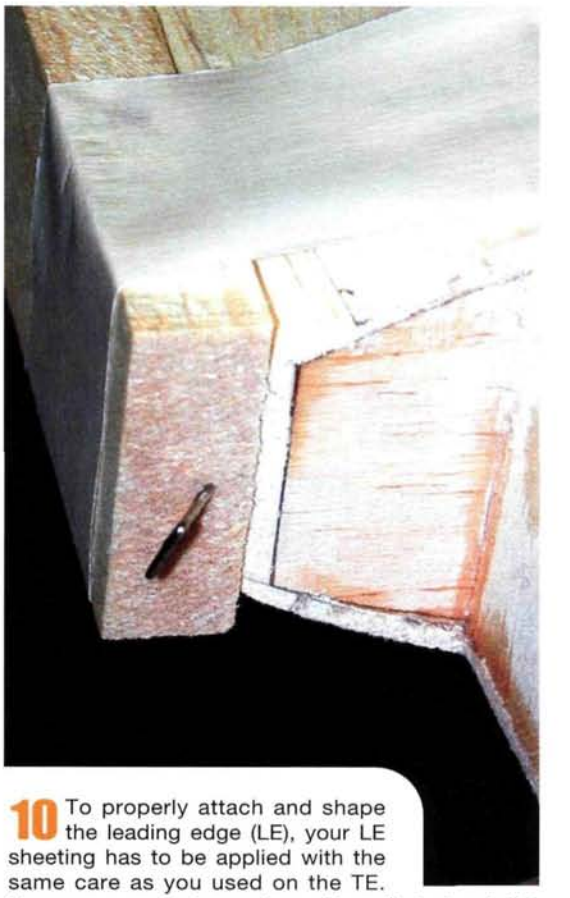
7 Using aliphatic resin applied with a fine-tip applicator, apply the adhesive to the ribs and chamfered edge of the lower sheeting. Take your time, and apply an even bead of glue to all the surfaces that will touch the top sheeting.

8 Now position the top sheeting and pin it securely into place, keeping its TE even with the bottom sheeting. Use plenty of pins.



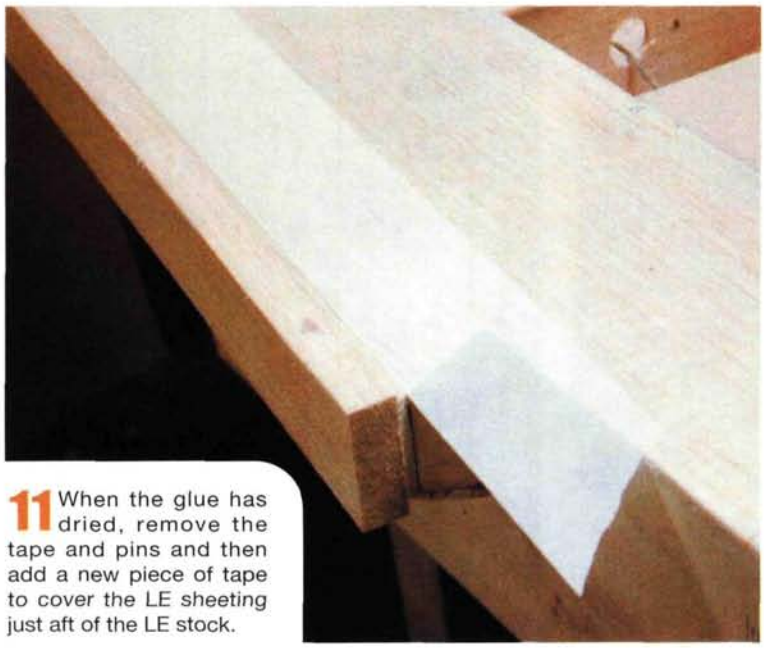


9 When the glue has dried (after a few hours), the wing can be removed from the board and the edges can be sanded. The key to a strong TE is proper glue bonding at the point where the top and bottom sheeting join. Also, by chamfering the lower sheeting, you minimize the thickness of the TE without compromising its strength.



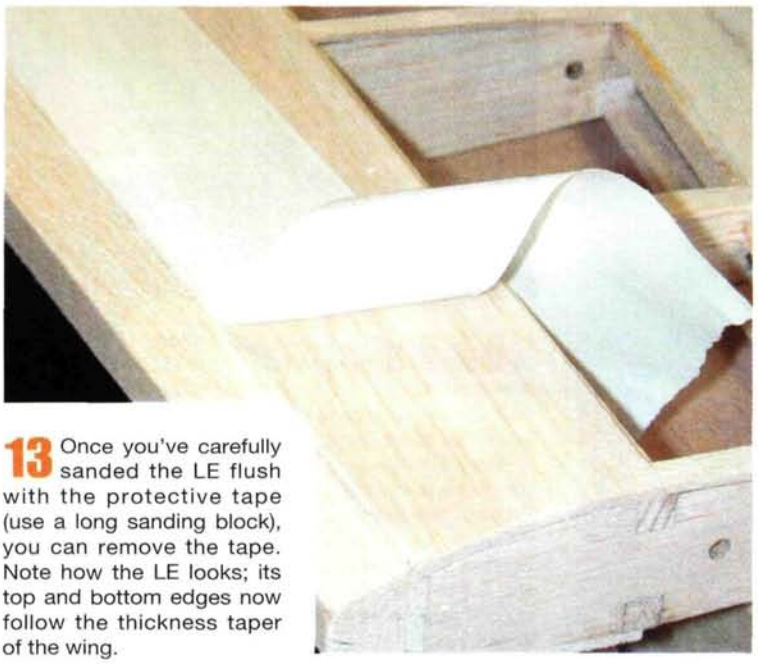
10 To properly attach and shape the leading edge (LE), your LE sheeting has to be applied with the same care as you used on the TE. Here you see a wing section with an 1/8-inch sub-LE design. This design makes it possible to first apply the top and bottom LE sheeting and sand their front edges straight before attaching the LE.

Cut the LE stock from a medium-hard sheet of the correct thickness, and cut it to length. Glue and pin the LE to the front of the wing, and apply several pieces of tape along its length to hold it under slight pressure until the glue has set.

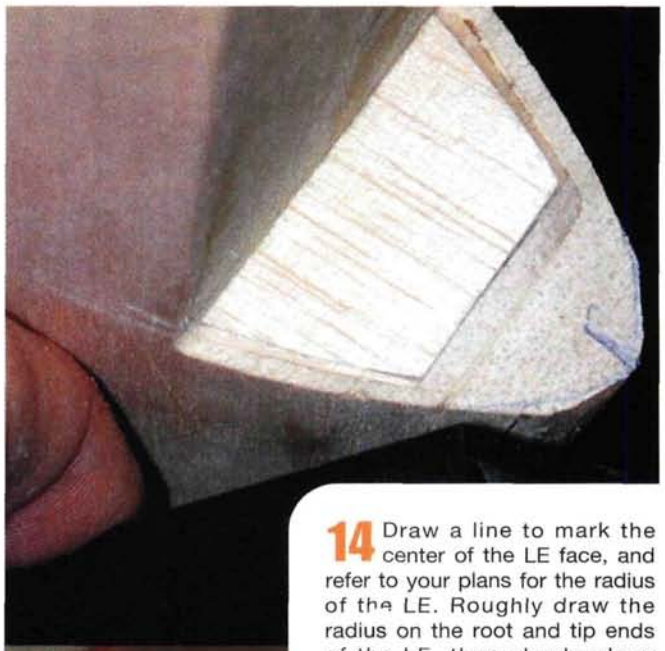


11 When the glue has dried, remove the tape and pins and then add a new piece of tape to cover the LE sheeting just aft of the LE stock.

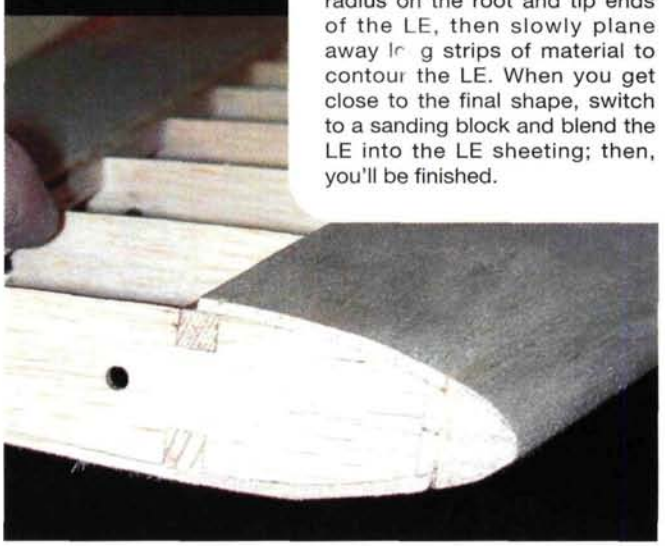
12 With the tape protecting the top surface of the LE sheeting, start to remove material from the LE stock with a razor plane. Make several light strokes with the plane, and remove just enough material to fair the top and bottom edges of the LE stock into the top and bottom LE sheeting.

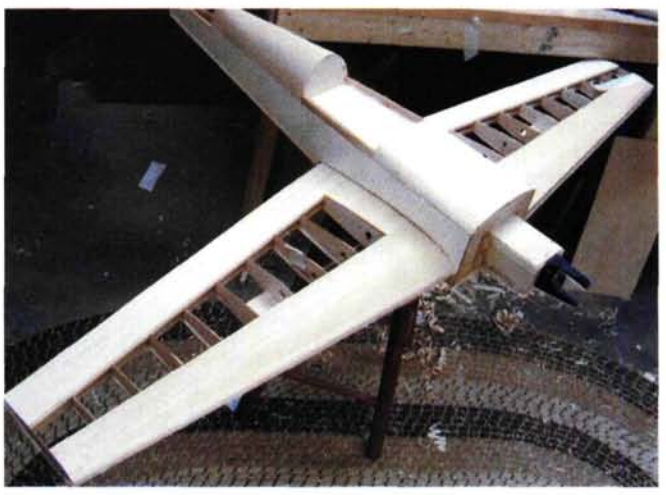


13 Once you've carefully sanded the LE flush with the protective tape (use a long sanding block), you can remove the tape. Note how the LE looks; its top and bottom edges now follow the thickness taper of the wing.



14 Draw a line to mark the center of the LE face, and refer to your plans for the radius of the LE. Roughly draw the radius on the root and tip ends of the LE, then slowly plane away long strips of material to contour the LE. When you get close to the final shape, switch to a sanding block and blend the LE into the LE sheeting; then, you'll be finished.





15 Here are the nearly finished wing sets, under my scratch-built S-300 Staudacher fuselage. The ribs have yet to be cap-stripped, and the ailerons still have to be cut out and assembled, but that's grist for another "how-to" article.

Proper leading and trailing edges are easy to make and don't require a lot of effort; they do, however, affect the strength of the wing and how well your model flies. Give scratch-building a try; you'll have lots of fun in the process, and you'll be proud of what you've built. ✈

WW I aircraft

Many fine WW I aircraft designs are on the market today, from older, classic wood kits to a new generation of impressively built, almost-ready-to-fly (ARF) kits. For instance, Arizona Model Aircrafters and 3 Sea Bees have started selling almost-ready-to-cover (ARC) and ARF kits. Built-up wood kits can be found from such companies as Balsa USA, Flair (available through Hobby Supply South), FunAero, Proctor Enterprises, Hobby Hangar and The Aeroplane Works. The latter's Ziroli Fokker Dr.I triplane, for example, is designed as a great flying, sport-scale model. It doesn't require the building of true-to-scale internal structures, as are found in the popular Proctor kits, but the finished project certainly looks good close up and in the air. Another beautifully designed triplane kit is available from Glenn Torrance Models. The Torrance kit very closely follows the prototype aircraft's method of construction.

If you like to scratch-build and want WW I scale airplane plans, then you should check Steve Stratt's impressive work at Aerodrome Models. Steve offers several not-often-modeled designs in clean, electric-powered versions. Nick Ziroli Plans offers other WW I designs, as do Rich Uravitch and Bob Holman Plans. Whether you like scratch-building, kits, or ARFs, there are many designs out there to get you into the Dawn Patrol skies.

Right: Dave Johnson's impressive Siemens Schuckert D-III is a wonderful example of a seldom-modeled WW I aircraft. The model has won several first-place trophies, and it flies beautifully! Below: this ¼-scale Fokker D-VII, designed by Gary Allan, is available as a* Model Airplane News *plan (FSP02981) and is also available as an Arizona Model Aircrafters kit. Great model for a Zenoah G-38 gas engine.

Above left: built by Steven Stratt, this unique WW I design is a Dornier/Zeppelin D-I powered by a geared AstroFlight 40 electric motor. The plan is available from Aerodrome Models. Above right: this Fokker triplane is from the Flair kit and is shown here flying at the Rhinebeck WW I jamboree in Rhinebeck, NY. It is an excellent flyer.

Here's how Dave held his D-III's fuselage formers in alignment while he applied the sheeting.

SIEMENS SCHUCKERT D-III

Many individuals design and build their own WW I aircraft. One modeler I recently met is Dave Johnson; he won the WW I category at the 2001 Westchester Radio AeroModelers (WRAM) Show with his original design ¼-scale Siemens Schuckert D-III. The prototype aircraft was flown in late 1918 and was used mostly by German naval squadrons. The aircraft had an exceptional rate of climb and was considered outstanding by the few pilots who flew it. This aircraft has always seemed to me to be an ideal RC subject, but the round, fully sheeted fuselage didn't inspire me. Dave built his model using a ¾-inch copper pipe as a center fuselage jig to hold all the formers in alignment. He drilled ¾-inch holes in the centers of the fuselage bulkheads, slid them onto the copper pipe, moved them to their respective positions and glued the fuselage longerons to them. He then added the balsa sheeting and ended up with a perfectly straight and strong fuselage in much less time than if he had used a standard jig- or crutch-construction method.

The proof of any design is in the flying, and I saw Dave fly the D-III at the Connecticut Valley Scale Meet back in June. Dave placed first in Expert, and the model

SCALE TECHNIQUE OF THE MONTH

This month, I thought I'd show a method of making dummy control cables. These just-to-look-at pull/pull cables don't move the control surfaces, but they look as if they do; a model pushrod linkage within the model moves the surfaces.

Using the elevator as an example, first determine where the pushrod will be connected to the elevator halves. For most models, a U-shaped metal joiner with a control horn soldered to it will simplify the setup. These elevator joiners are available at the hobby shop or from Sig Mfg.'s catalog.

Cut a piece of 3/16-inch dowel to fit across your fuselage, aft of the cockpit. Make a pair of ply tiller arms, and drill a hole in their centers so they will slip over the dowel. Drill 1/16-inch holes at the ends so you can attach the control cables. Make the two double-arm control horns from 3/32-inch plywood, and make sure they are equal in length to the tiller arms. See the illustration for details.

Make two 1/8-inch ply plates and drill 3/16-inch holes in them to support the dowel. Slide the tiller arms onto the dowel along with the two end plates, and place the unit in the fuselage. Glue the plates to the inside of the fuselage sides, and make sure that the dowel is level with the bottom of the fuselage and parallel with the elevator hinge line. To prevent the dowel from moving left or right, glue a piece of 1/32-inch plywood over the holes in the plates.

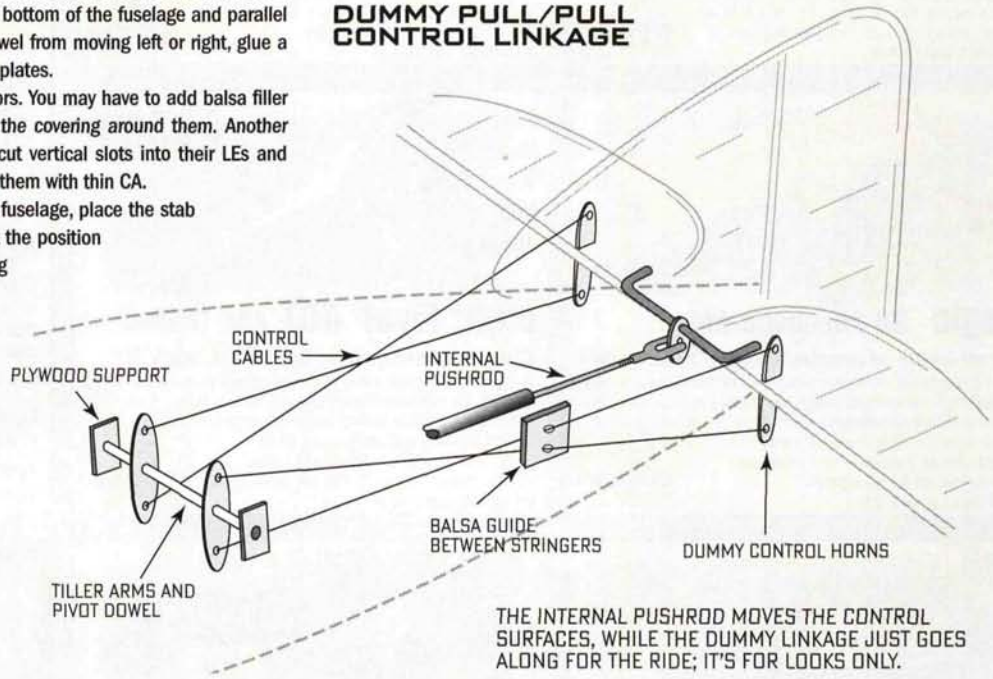
Now attach the control horns to the elevators. You may have to add balsa filler around the horns so you'll be able to attach the covering around them. Another way to do this is to cover the elevators first, cut vertical slots into their LEs and then slip the control horns into place and glue them with thin CA.

To figure out where the cables will exit the fuselage, place the stab and elevators on the fuselage and then adjust the position of the tiller arms along the dowel. Use string tied to the tiller and control arms and move the tillers until the string exits the fuselage at approximately the scale location you want. Glue the tillers into place and then mark the locations of their exit points on the nearby stringers. Remove the strings and fill in the area between the stringers with 1/8-inch balsa glued flush to the outside of the fuselage. Drill small holes in the balsa for the cables to exit.

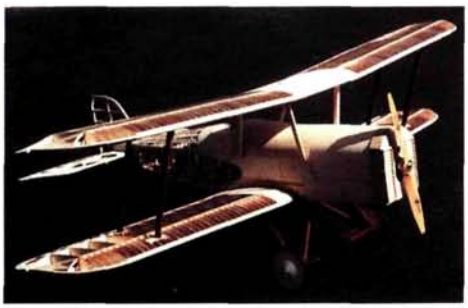
Finish building your airplane, and cover it. I leave a portion of the fuselage open so I can attach the cable after the tail section has been painted. I use standard Proctor Enterprises control cable, but you can use any material you like; even fishing string will work. I cut 1/8-inch-long pieces of 1/16-inch aluminum tube to use as swages. Slip them onto the cable, attach the cable to the control horns, and crimp the swages to form the end loops. Feed the cable into the exit holes, and attach them to the tiller arms. I connect the top elevator horn to the bottom of the tiller arm and the bottom horn to the top of the tiller arm. Try to keep the cables taut, but don't overtighten them, as this will put undue strain on the control surfaces.

That's it. I am sure you will find it very easy to install this system in your next WW I airplane. Once you've done it, you may even feel confident enough to install a fully functional pull/pull cable control system in your next project. Have fun!

DUMMY PULL/PULL CONTROL LINKAGE



THE INTERNAL PUSHROD MOVES THE CONTROL SURFACES, WHILE THE DUMMY LINKAGE JUST GOES ALONG FOR THE RIDE; IT'S FOR LOOKS ONLY.



Here's my FunAero British SE5a biplane, ready to cover. The all-laser-cut, CAD-designed kit is a dream to build.

will be featured in a construction article in a future issue of *Model Airplane News*. Dave's model also earned him first place at the New England Scale Masters qualifier in Gardner, MA.

FUNAERO SE5a

The FunAero SE5a that I featured in the column several issues ago is now completely framed and ready to cover. This plane is very easy to build, and the laser-cut kit is an exceptionally good value. The model's outline is very close to scale, and I think that when I finish the model, some of my scale buddies will be surprised when they see how nice it looks.

FunAero designed the SE5a to be a fun-to-fly, sport-scale plane. Though it wasn't meant for serious scale competition, its overall appearance is very impressive. The FunAero people had conventional building techniques in mind when they developed this aircraft, and I am very pleased with the modeler-friendly design of the kit. I'll show more pictures in a future issue when the model is ready to fly.

***3 Sea Bees Models**, P.O. Box 747, Lake Stevens, WA 98258; (425) 334-6089; fax (425) 397-2126; www.3seabees.com.*
***Aerodrome Models**, P.O. Box 1425, FDR Station, New York, NY 10150.*
***Arizona Model Aircrafters**, 14795 N. 78th Way, Unit 800, Scottsdale, AZ 85260; (480) 348-3733; fax (480) 348-3773; www.arizonamodels.com.*
***Balsa USA**, P.O. Box 164, Marinette, WI 54143; (906) 863-6421; fax (906) 863-5878; www.balsausa.com.*
***Bob Holman Plans**, P.O. Box 741, San Bernardino, CA 92402; (909) 885-3959; fax (909) 889-9307.*
***Flair**; distributed by Hobby Supply South, 1720 Mars Hill Rd., Ste. 8365, Acworth, GA 30101; (770) 974-0843.*
***FunAero R/C**, 4385 Redlane Rd., Palzell, SC 29040; (803) 499-5487; www.funaero.com.*
***Glenn Torrance Models**, 2404 Bane Rd., Efland, NC27243; (919) 643-1001; fax (919) 643-1002; www.gtmodels.*
***Hobby Hangar**, 7715 Industrial St., W. Melbourne, FL 32904; (321) 727-8227; www.hobbyhangar.com.*
***Nick Ziroli Plans**, 29 Edgar Dr., Smithtown, NY 11787; (516) 467-4765; fax (516) 467-1752; www.ziroliplans.com.*
***Proctor Enterprises**, 25450 N.E. Eilers Rd., Aurora, OR 97002; (503) 678-1300; fax (503) 678-1342; www.proctorenterprises.com.*
***Rich Uravitch**, 5629 Cypress Creek Dr., Grant, FL 32949.*
***Sig Mfg. Co. Inc.**, P.O. Box 520, Montezuma, IA 50171; (800) 247-5008; (515) 623-5154; fax (515) 623-3922; www.sigmfg.com.*
***The Aeroplane Works**, 2134 Gilbride Rd., Martinsville, NJ 08836; (908) 356-8557; www.theaeroplaneworks.com.*

by Dave Gierke

Break-in: the secret to longevity and reliability

The scene is all too familiar: an engine is fired up for the first time at the flying field; that white-knuckle first flight is almost at hand. The anxious modeler surveys his shiny new model and reflects on the time and money required to get to this moment.

The engine, if it's lucky, has had a few tanks of fuel run through it before the pilot advances the throttle for takeoff. As the model breaks ground and climbs for altitude, he may have his hands full with an out-of-trim machine when the worst happens: the engine quits!—a nasty thing to occur so close to the ground with a nose-high attitude and low airspeed. If down-elevator isn't applied immediately, the model will likely experience a stall or stall spin; the consequences are usually catastrophic.

Preparing to start the large OPS 30cc 2-stroke engine for break-in on the large American Hobby Products test Stand, Gary Caruso tightens the hub on the two-piece APC break-in propeller.

If fortunate, the model lands safely. Although the engine is still smoking and too hot to touch, opinions on its troubled performance are offered by several modelers: "This brand of fuel isn't any good." "Did you use the right glow plug?" "The prop's too big." From the background, a timid voice is heard to say, "The engine sounded a bit lean to me. Does it have much running time on it?"

All of these problems could be responsible for the engine's sudden stoppage, but in my opinion, the number one cause is the lack of proper break-in. Some say they always achieve satisfactory break-in while flying the model. This is possible; I've done it myself when pressed for time. However, modelers should become familiar with the running characteristics of their engines while attaining reasonable reliability before installing them in models. Lean, hot-running engines are not only unreliable but also often damaging to internal components, affecting both performance and longevity.

The following discussion is designed to convince those of you who have no opinion about the necessity and benefits of test stand break-in. For the others who routinely do it in the air: good luck!

WHAT IS BREAK-IN?

The late Peter G.F. Chinn, longtime engine review columnist for *Model Airplane News*, defined engine break-in as: "... the process involved in aiding an engine's transition from a newly assembled conglomeration of assorted metal parts to an efficient working whole." He elaborated, "It means running the engine under carefully controlled conditions at the *beginning of its life* [my emphasis] in order to avoid the risk of immediate damage ... and to help working surfaces to become properly smoothed and aligned for maximum mechanical efficiency and performance." This statement, made almost 40 years ago, still holds true.

CONSEQUENCES

If you don't take the time, or if you don't perform the break-in correctly, your expensive new engine could be damaged almost immediately. Here's a partial list of deficiencies that will limit the engine's effectiveness:

- Difficulty in setting the high-speed needle valve (narrow range);
- Reduced peak power (at what rpm the engine will turn a given propeller);
- Difficulty in setting the idle needle valve (narrow range);
- Difficulty maintaining an acceptable idle (unreliable);
- Poor throttle-up characteristics (poor mixture control through the mid-range); and
- Hot running, cranky operation, similar to a varnished engine with a piston and cylinder that need to be cleaned.

These problems are directly related to the condition of the piston and cylinder fit. Excessive piston to cylinder clearance produces:

- Combustion gas blowby (wasted power, high piston temperatures due to poor heat transfer to the cylinder, poor cylinder-wall lubrication retention, piston skirt and/or ring damage); and
- Poor crankcase compression (2-stroke idle and throttle transition problems).

INSIDE THE RUNNING ENGINE

When the engine is running, we can't see what's happening inside, but here is what researchers tell us probably occurs:

- Cool air and fuel mixture enter the cylinder on one or more sides of the piston while hot exhaust gases exit the other; unequal piston expansion and distortion is probable in a 2-stroke engine.
- Cylinder temperatures are greater above the ports where combustion occurs; therefore, the cylinder expands more at the top than at the bottom, affecting the wear pattern of the piston in a 2-stroke engine.
- In 2- and 4-stroke engines, as the piston is being pushed away from the cylinder head by expanding, high-pressure gases, the connecting rod forms an angle with the axial centerline of the cylinder. This produces a side thrust (vector force) that generates a distorting load for the piston against the cylinder. This load isn't nearly as great on the opposite wall for the return stroke because the force is minimal.
- In 2- and 4-stroke engines, if air cooling to the cylinder is uneven, the aluminum-alloy jacket (crankcase) may distort the cylinder which adversely affects the running fit of the piston.

The extent to which each of these factors affects an engine's performance is the subject of debate among experts. One thing is certain: you can't force these changes to occur unless the engine is actually run, brought up to temperature and then allowed to cool, time after time.

HEAT CYCLING

Some argue that the accuracy of modern machining technology eliminates the need for break-in. Others (including me), believe that molecular instabilities within the parts due to manufacturing processes need final stress relief; this is accomplished by the repeated heating and cooling cycles within the engine itself. Known as "heat

cycling," the process consists of short engine runs and complete cooling repeated multiple times.

ENGINE CATEGORIES

Since design and metallurgy differ from engine to engine, so does the break-in procedure somewhat. The type of piston and cylinder combination determines which of two general categories the engine falls into; there are only two break-in procedures (one for each category).

• **Non ABC-type (2- and 4-stroke)**

—Lapped iron or steel pistons (no compression ring) running in iron or steel cylinders. Examples: several modern Fox and Enya engines; many nostalgia period engines including K&B (green head), Veco, Johnson, Fox, O.S., etc.

—Ringed aluminum-alloy piston running in steel, iron, or brass cylinders and known as "ABCD" (aluminum piston, brass cylinder, chrome-plated with Dykes ring). Examples: most modern, large-displacement engines, e.g., Moki, MVVS, Aviastar and GMS; Saito, Enya and O.S. 4-strokes; and many antique and nostalgia engines including McCoy, SuperTigre, K&B, Enya and Webra.

• **ABC-type (2-stroke)**

—**ABC.** Lapped aluminum alloy piston (no compression ring) running in chrome-plated brass cylinder.

—**AAC.** Lapped aluminum alloy piston running in chrome-plated aluminum cylinder.

—**ABN.** Lapped aluminum alloy piston running in nickel-plated aluminum alloy cylinder.

NON-ABC ENGINE BREAK-IN

To break in a non-ABC engine, the running temperature must be reduced and its internal components flooded with lubricant. Let's take a closer look at these concepts:

• **Temperature.** When a 2-stroke-cycle engine is operated very fuel-rich, it begins to 4-cycle, or fire on alternate crankshaft revolutions. Without exploring the reason for this at this time, it may be stated that reducing combustion events by 50 percent over a period of time reduces the operating temperature—a very desirable condition for breaking in non-ABC-type engines.

There's a pronounced difference in sound between 2-cycling and 4-cycling. The human ear senses this as a change in exhaust frequency. As a 2-cycling engine is progressively richened by the primary needle valve, a point is reached on the speed range at which a sudden loss in rpm is experienced, along with a change in exhaust note. This is 4-cycling. Get to know it; it's the sound of a cool running engine.

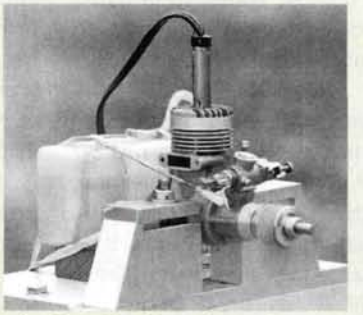
• **Lubrication.** Four-cycling also enhances lubrication. Coupled with oil volumes of between 24 and 28 percent, break-in requirements are adequately satisfied. After break-in has been achieved, these percentages may be reduced to the engine manufacturer's recommendation.

Castor oil should always be included as part of the lubrication package. It offers unsurpassed protection from hot, lean runs that would otherwise damage engine components if only synthetic oils were used. I suggest using castor for at least one third of the oil package, e.g., if the total oil volume is 24 percent, the minimum amount of castor should be 8 percent.

How long does break-in take? As you might expect, break-in time varies for each engine type, also from manufacturer to manufacturer. During the 1930s through the 1950s, engine companies recommended 3 to 5 hours on the bench before all-out operation of their lapped iron and steel piston and cylinder engines.

Back in the old-old days ('30s and '40s), many modelers attempted to shorten the lapped piston break-in period by "motoring" the engine. This consisted of mounting the engine on a drill press or metalworking lathe, where it was turned over for a number of hours using lots of lubricating oil, which also acted as a coolant. This procedure didn't help the piston

NON-ABC ENGINE SAMPLE BREAK-IN



The Fox .40 with an iron piston and a lapped-steel cylinder sleeve runs for the first time—very rich and 4-cycling. Until it loosens up, a new engine may require glow heat for the first few runs.

• **Log.** Keep notes during break-in: include run time, rpm and any special details for each run.

• **Fuel.** Use low nitromethane content for non-ABC-type engines (5 to 10 percent nitro and between 24 and 28 percent lubricant).

• **Muffler.** The engine will run cooler if the muffler is removed for break-in; however, you'll lose the solid needle-setting muffler-pressure advantage, and the neighbors won't appreciate the additional racket, so leave it on.

• **Propeller.** Use one that is smaller than the recommended flight size, e.g., 12x6 for flight; 12x5 for break-in. Air-cooled 2-stroke engines run cooler when the load is reduced.

• **Procedure.**

1. Set the needle valve for a rich start (see engine owner's manual).
2. Start the engine (leave the glow heat on).
3. Adjust the needle valve for 4-cycling operation.
4. Run for approximately 1 minute.
5. Perform step 4 four to six times with cooling-off periods between. When you can hold the cylinder head without getting burned, the engine is ready for the next run.
6. Run the engine for 3-minute periods, rich 4-cycling as before. Cool completely between runs. Perform eight to 12 times. Remove the glow heat if the engine will continue to run; if it doesn't, leave it connected.
7. Start the engine. Lean the needle valve until the engine breaks into a rich 2-cycling operation. Listen carefully to the engine and track the rpm with a tachometer. If the engine begins to slow down, quickly richen the needle valve. In such a case, the engine is still too tight and needs to be run more. Revert to step 6 until the engine will hold a setting at the leaner setting.
8. At this point, lean the mixture (needle valve) to a fast 2-cycling setting. Momentarily pinch the fuel line between your thumb and forefinger while tracking the rpm with your tachometer. The rpm should increase by at least 200 to 300 for this needle-valve setting to be correct. Adjust the needle valve to achieve this.
9. The engine should hold its setting for at least 30 seconds without losing speed. If it still doesn't maintain rpm, richen the mixture and run through step 7 again. Remember that the break-in process requires relatively short engine runs during which cyclic heating and cooling relieve internal stresses within engine components.

and cylinder fit because combustion temperatures and pressures were absent, but the connecting rod and wristpin holes usually polished up.

In the old days ('50s and '60s) some enthusiasts ran their new engines continuously on a large supply of fuel. The rich needle-valve setting kept them cool, and they assumed that after several hours, the break-in job was complete. Tests have shown that little, if any, break-in occurs unless the engine is heated to normal operating temperatures and then allowed to cool. As mentioned earlier, heat cycling does the job.

Ringed-piston engines require less break-in time than lapped versions, but patience is still necessary. The Moki 2.10 engine that I tested in the October 2001 issue wasn't fully broken in until after completing 3 hours of careful running. Now, it's a tremendous engine, exhibiting great compression and high torque and brake horsepower. The K&B .40 low-tension-ring RC engine (no longer in production) is another good example. K&B recommendeds a 1-hour break-in. My experience with this engine suggested that 2 to 3 hours were required for a top-performing long-lasting unit. Fox recommends running its .40 RC "... rich for the first few tanks of fuel." Mine still isn't fully broken in after 4 hours!

When is it broken in? Time alone isn't an indicator of when break-in is complete. Break-in requires short running periods during which the needle valve is occasionally leaned to a point where the engine comes up to speed and temperature, then is immediately richened to cool it down.

A general rule suggests that lapped and ringed non-ABC-type engines are broken in when they'll hold a peak rpm setting without sagging (slowing down) for at least 30 seconds. For ringed engines, there is a visible sign that break-in is probably complete: when the machine marks have disappeared from the visible edge of the compression ring (as viewed through the open exhaust). Lapped engines are more difficult to assess through observation, although some experts are guided by the color and uniformity of wear on the piston. Also, if the piston doesn't leak a little compression at top dead center (TDC), it probably needs to be run more.

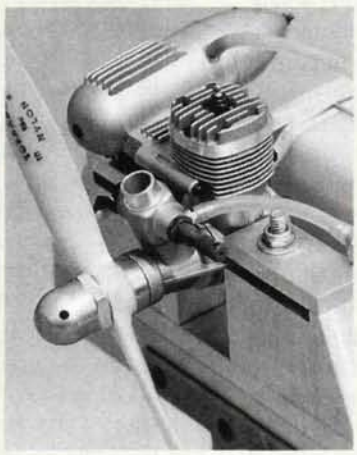
ABC ENGINE BREAK-IN

The newer ABC-type engines require less time for break-in than the lapped or ringed iron and steel combinations described earlier. For an ABC engine to attain and maintain maximum performance levels, however, an entirely new set of break-in procedures is required.

As mentioned earlier, ABC-type engines include ABC, AAC, and ABN piston and cylinder combinations in the lapped configuration (ringless). They rely on a very close fit between the piston and cylinder to prevent combustion gas blowby at operational temperatures and speeds. The primary advantage of the ABC concept is the ability of the piston and cylinder to expand from ambient to operational temperatures at almost equal rates, thus avoiding the damaging seizures occasionally experienced by non-ABC types. Complications arise because the portion of the cylinder above the transfer and exhaust ports operates at a much higher temperature than below the ports, allowing the upper cylinder to expand more than the bottom. To compensate for this, the cylinder bore is machined with a taper, producing a smaller bore at the top than at the bottom.

Trial-and-error experimentation in the 1970s discovered that ABC engines performed best when the piston actually interfered with the cylinder (zero clearance) at TDC (ambient temperature). This is a squeak that may be heard and the resistance felt when turning these engines over without the glow plug installed. Since the high-silicon-content aluminum alloys used for the piston allow the plated brass cylinder to expand slightly more at running temperatures, a free-running assembly is achieved while maintaining a gas-tight, blowby-free combustion chamber.

ABC ENGINE SAMPLE BREAK-IN



Pro-Magnum .36 ready for break-in. You should run an ABC engine on the test stand for at least 45 minutes, 2 to 3 minutes at a time, with adequate cooling periods between runs.

- **Log.** Keep notes during break-in; include run time, rpm and any special details for each run.
- **Fuel.** Use the highest nitromethane content recommended by the engine's manufacturer—usually between 5 and 15 percent nitro. Lubrication content should be 20 percent. Use some castor oil.
- **Muffler.** The engine will run cooler if the muffler is removed for break-in; however, you'll lose the solid needle-setting muffler-pressure advantage, and the neighbors won't appreciate the additional racket, so leave it on.
- **Propeller.** Use one that is smaller than the recommended flight size, e.g., 12x6 for flight; 12x5 for break-in. Air-cooled 2-stroke engines run cooler when the load is reduced.
- **Procedure**

1. Set the needle valve for a 2-cycling start (see engine owner's manual).
2. Start the engine; if necessary, leave the glow heat turned on to keep the engine running.
3. Adjust the needle valve for a rich, 2-cycling operation.
4. Run for approximately 1 minute.
5. Perform step 4 four to six times with cooling-off periods between.
6. Run the engine for 3-minute periods, rich 2-cycling as before. Cool completely between runs. Perform five to eight times.
7. Start the engine. Allow it to warm for at least 20 seconds. Lean the high-speed needle valve until the engine peaks (attains maximum speed) as determined by a tachometer. Back off (richen) 200 to 300rpm. Check this setting by pinching the fuel line while you watch the tachometer; rpm should increase by 200 to 300 and then return to the original rpm. Listen to the engine closely and watch the tachometer. If the engine begins to slow, quickly richen the needle valve to the rich 2-cycling position of step 6, as the engine needs more running time.
8. The engine should hold its semi-peak setting for at least 30 seconds without losing speed. If the engine still doesn't maintain rpm, richen the mixture and run through step 6 again.

Remember that the break-in process requires relatively short engine runs during which cyclic heating and cooling relieves stresses within engine components. ABC-type engines usually take 30 to 45 minutes to break in.

The problem with this system centers on a narrow band at the top of the piston's head, just below the crown, where it contacts the cylinder at TDC. Typically measuring only about 0.060 to 0.125 inch in height, depending on the size (displacement) of the engine, it controls the operational fit of the piston within the tapered cylinder. Wear it slightly (smaller diameter), and the delicate balance shifts; a great running engine is now only adequate. Wear it a bit more and the engine is worn out. Unfortunately, all of this can happen during the first few runs of a new ABC-type engine, perpetrated by an unsuspecting operator.

The objective of ABC-type engine break-in is to maintain the delicate top-of-the-piston fit while allowing the internal components to heat-cycle for the purpose of stress relief. Sound simple? Let's look at the requirements:

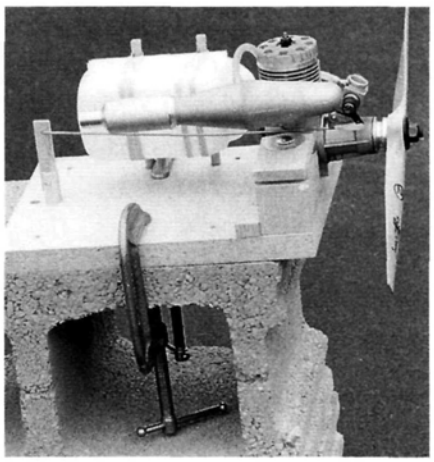
• **Fuel.** From the outset, use the highest factory recommended nitromethane fuel content. If the instructions say to use 5 to 15 percent nitro, then use the higher 15 percent. This generates the highest combustion temperature, resulting in the greatest expansion and therefore the most clearance between the piston and cylinder (when they're the tightest they'll ever be). After break-in, this same fuel must be carried over to the flying phase of the engine's operational life.

After running the engine for a season or two, you'll probably notice that performance begins to diminish (nothing lasts forever!). Performance can be determined by comparing tachometer readings on a standard propeller from when the engine was new to the time of comparison. If rpm drop by several hundred or more, the piston and cylinder clearance is probably excessive, so you should reduce the nitro content to 5 percent. Less nitro means lower combustion temperatures and less component expansion; this results in a tighter piston and cylinder fit with less blowby and lost power. Experience has shown that reduced nitromethane content is compensated for by the improved piston and cylinder fit at running temperatures. That's why some "worn-out" sport pylon racing engines make very acceptable fun-flying engines: less nitro!

• **Lubrication.** For break-in, use 20 percent lubrication by volume. This is the standard oil content I use throughout an ABC-type engine's life—break-in and flying. One-third of this volume is castor oil, the greatest insurance policy you can buy against engine damage due to a hot, lean run.

Competition racers sometimes experiment with oil percentages of less than 20 (percentages of 18, 16, 14 and less have been used). Reducing the mass of lubricants in the air and fuel mixture may improve flame propagation (burning) in the combustion zone, which ultimately affects power output. These are minor performance gains and best left to the experimenter. Similar reductions in oil content have been tried with questionable results by individuals attempting to improve an engine's idle and throttle-ability.

• **Two- vs. 4-cycling operation.** If it were possible to completely eliminate 4-cycling within an ABC-type engine, it would be a great day for its longevity. Four-cycling operation is cool operation, which leads to premature wear. Never purposely run an ABC-type engine 4-cycling rich; the relatively cool temperatures generated by firing every other revolution of the crankshaft accelerate piston wear and the onset of reduced performance.



This all-wood, American Hobby Products test stand is designed to be clamped to a bench top or cinder block (as shown). It incorporates a novel throttle-lever assembly that allows the operator to make minute carburetor adjustments. Moderately priced, it's suited to occasional to moderate use.

Because ABC-type engines were originally designed as wide-open throttle racing engines, their pistons and cylinders operated happily. Today, ABC engines are also expected to idle and throttle reliably. Unfortunately, this allows them to cool excessively, especially below ½ throttle, where poor cylinder scavenging causes them to 4-cycle, rubbing away at the critical piston and cylinder fit.

Because throttling is a necessary component of RC flying, you can't simply eliminate it from your routine; however, never throttle the engine during break-in. Afterward, when engine components have been stress-relieved through heat-cycling, the effects of throttling will be minimized. These effects may be further reduced by setting the idle needle valve on a fuel-metering carburetor to its leanest position while still maintaining a reliable idle and transition to wide open throttle.

• **Tight ABC piston and cylinder.** When new, some ABC-type engines are so tight at TDC that the possibility of damage to components (connecting rod, wristpin, crankpin or piston) exists the first few times the engines are cranked over. To avoid this situation, warm the cylinder and head with a heat gun before the first few starts; this will cause the cylinder to expand, pulling away from the piston, permitting you to easily crank over the engine.

TEST STAND

If you're serious about preparing your engines for that first flight, a test stand is essential. The test stand must be sturdily constructed and able to hold the engine securely with a minimum of vibration. It actually consists of two parts: the test stand itself and its base. The test stand can be of superior quality, but if it's mounted on a flimsy base, such as a wooden box, the assembly will probably vibrate and could become a safety hazard by moving forward or tipping over.

Provisions must be made for mounting the fuel tank at the proper level in relation to the horizontal centerline of the carburetor metering jet (spraybar), and some method of throttle control is needed. American Hobby Products manufactures several different sizes of well-designed wooden test stands that meet all of the criteria, at very reasonable prices.

Wear your hearing protectors, get out a lawn chair and a nice cool soda, and drive your neighbors nuts—just kidding! ✈

American Hobby Products, *12 West Hill Cir., Reading, MA 01867; (781) 944-8316; fax (781) 944-3585.*

APC Props; *distributed by Landing Products, 1222 Harter Ave., Woodland, CA 95776; (530) 661-0399; fax (530) 666-6661; www.apcprop.com.*

OPS Engines; *distributed by Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.*

HERR ENGINEERING

Mini-Floats

A laser-cut kit for small models

by Randy Randolph

On the step and about ready for takeoff! These floats should support an airplane of up to 26 ounces with no difficulty.

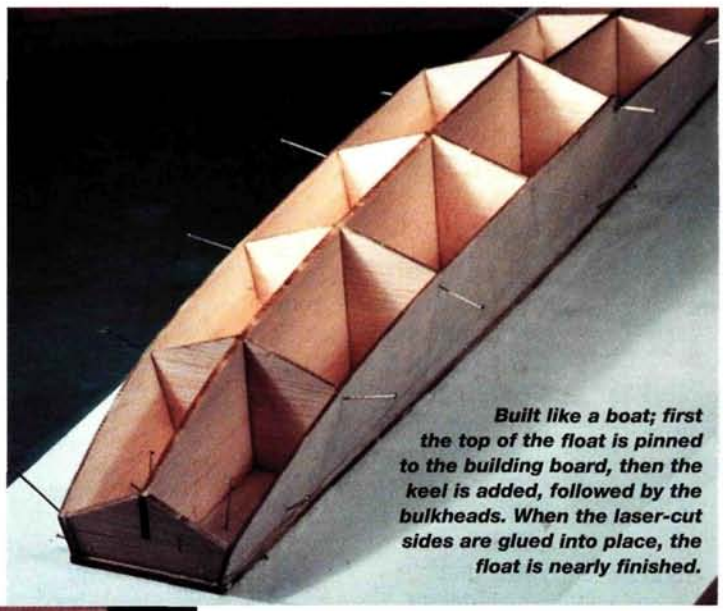
I am lucky enough to belong to a club with a very nice 50-acre lake just off the north end of its concrete runway, so I've had lots of practice building and flying float- and seaplanes during the long, hot Texas summers. Since my primary interest is in small model airplanes, most were in the .049 to .061 size engine class. I have built floats from foam, balsa sheet, balsa blocks, plastic and even doped cardboard! If Herr Engineering had produced its Mini-Floats kit years ago, I would never have fooled with the things I cobbled up! The Mini-Floats look like the classic Edo type, work perfectly and are lightweight and easy and quick to build!

The Mini-Floats kit is simplicity itself with all of the laser-cut parts, sheet balsa, hardware and instructions packaged in a single plastic sleeve. The included hardware provides everything necessary to mount the floats on an airplane, with the exception of a length of Nyrod. The instructions are complete and explain how to mount the floats on just about any airplane that has conventional gear.

IN THE WORKSHOP

Following the instructions, I labeled the parts before removing them from their carrier. The construction of each float is of the egg-carton style; the top is pinned to the workbench, and the tabbed keel is glued to the slots in the top. The construction is completed when the bulkheads are fitted and glued into matching slots in the keel. I did this just as instructed and ended up with a straight, true, basic structure. While the tops were still pinned to the building board, I added the laser-cut sides as instructed and held them in place with pins until the glue had set.

The instructions then tell you to sand the bottom of the floats (which are actually facing you at this point) to remove any bumps that would get in the way of the sheeting. I thought it was easier to remove the floats from the building board to sand them and then return them to the board for the sheeting.



Built like a boat; first the top of the float is pinned to the building board, then the keel is added, followed by the bulkheads. When the laser-cut sides are glued into place, the float is nearly finished.

This compact Mini-Floats kit contains very good balsa sheet and beautiful laser-cut parts, along with almost all the hardware needed to complete the floats and the installation.

Sheeting the bottom section of the floats aft of the step was very easy; just be sure that there's a good joint at the step. I used aliphatic resin glue for this and held the sheet in place with pins and masking tape while it set. Before sheeting the forward section, I trimmed each sheet to fit the curve produced by the keel's downward (upward when the floats are upright) sweep to the tip. I then sprayed the sheets with water, allowed

SPECIFICATIONS

Model: Mini-Floats

Manufacturer: Herr Engineering

Type: for 36- to 50-inch-span models powered by .061- to .15-size engines (or equivalent)

Length: 23¾ in.

Weight: 4.9 oz. (4.5 oz. as built)

Retail price: $49.95

Features: laser-cut balsa parts, steerable water rudder, mounting hardware and illustrated instructions.

Comments: designed specifically for the Herr Cloud Ranger and the Herr J-3 Cub, these Mini-Floats are also a perfect fit for any small glow- or electric-powered airplane in that size and weight class.

HITS

- Excellent laser cutting.
- Good wood selection.
- Good instructions with photos and illustrations.

MISS

- Laser-cutting the bottom sheets to shape would simplify the assembly quite a bit.

Above: once the bottom sheet is in place, the nose block is glued and shaped to finish the float. A razor saw held flat on the bottom sheet does a nice job of rough-cutting the nose block.

Left: while still pinned to the building board, the bottom sheeting is added. The first section is from the step aft, followed by the sections from the step forward.

Below: the water rudder is controlled by simply running a Nyrod from the tiller to the rudder horn on the airplane. A tie-wrap holds the Nyrod in place on the rear strut.

them to dry a bit and cemented them into place. The damp sheets were easy to form, and the job proceeded smoothly.

With the bottom sheeting complete, I sanded the sides and sheeting flush and squared off the front and back of each float. Then I glued the provided balsa blocks to the front of each float and allowed the glue to cure. I used a razor saw to trim the nose blocks to shape and 100-grit sandpaper to finish them, as shown in the instructions. It took less than 10 minutes to finish the sanding.

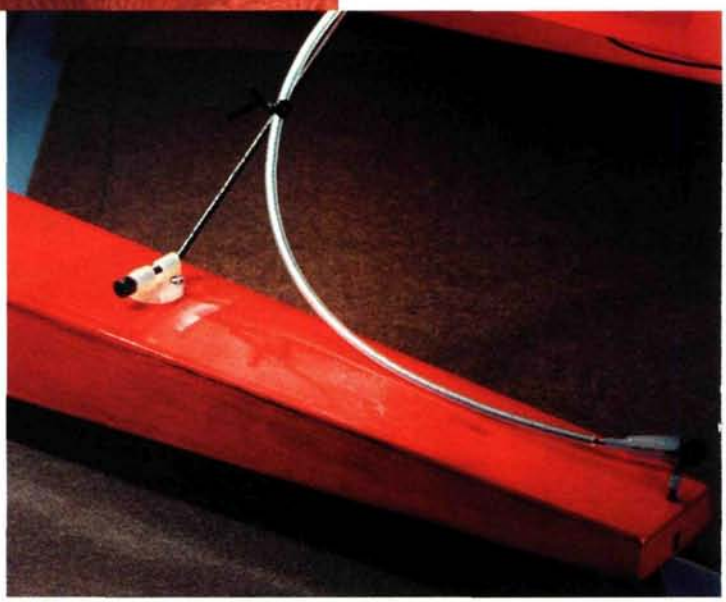
After I had established the position of the attachment fittings on each float, I feathered the edges of each ply mounting plate so that they would blend into the top sheeting when the covering was applied, then I cemented them in place to support the fittings. The last step before covering is to drill an ⅛-inch hole in the aft end of one float and glue the plastic water-rudder mount into place, then sand it flush with the top and bottom of the float.

I covered the floats with Transparent Clear Oracover to match the airplane for which the floats were intended—a Speed 400-powered version of my old Nickel. The finished weight of the floats, including all hardware, was 4.5 ounces; not bad!

I installed a water rudder, as the instructions dictate, even though I didn't think one was really necessary on an airplane of this size. I was glad I did because the plane maneuvered much more quickly on water; this is handy in somewhat restricted areas.

ON THE WATER

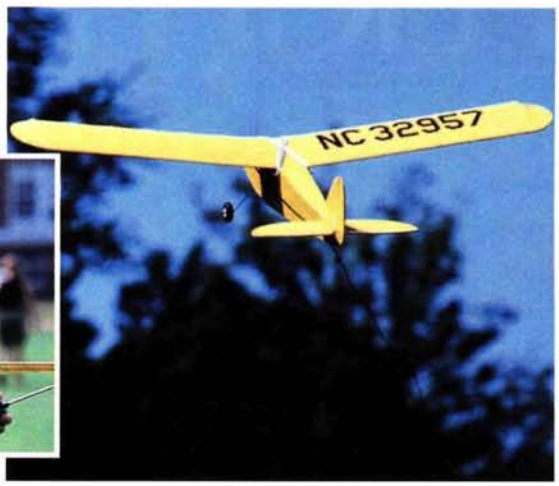
How did they work? Just fine! The Nickel's takeoff run was fairly long because of the additional weight and the water drag. The model was up on the step in about 60 feet and airborne in another 25 to 30. Touch-and-go's were really fun, and the floats performed very well, even in a light chop. Landings on grass are smooth and didn't cause any damage. This winter, I hope to try them on snow—if there is any this year! ✈



Herr Engineering, 1431 Chaffee Dr., Ste. 3, Titusville, FL 32780; (407) 264-2488; www.iflyherr.com
Hobby Lobby Intl., 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948; www.hobby-lobby.com.
Oracover; distributed by Hobby Lobby Intl.

A new launch

As some of you may have noticed, this "park flyer/backyard flyer" thing is taking off at the speed of sound. Others of you may have noticed that we are launching a new magazine called *Backyard Flyer* that will be dedicated to this very subject, and the tremendous email response to the first couple of "Backyard Flyer" columns has verified your interest in small RC. So all you fly-close-to-home types—and that includes many of you big-model-loving club members, too—get ready for your own magazine. Here's a sampling of what's in our first *Backyard Flyer* (the magazine) issue, and also what is coming up in the next "Backyard Flyer" (the column). As you can see, whatever your interest is, this blossoming world of mini-modeling has something for you.

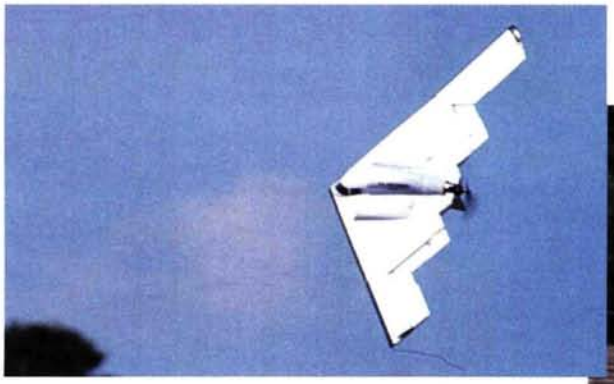


That's Gerry and me with House of Balsa's micro Cub. Astro's .010 brushless motor and speed controller power this high-performance Cub. Not only does this motor/power combination deliver superior performance, but it also serves up superior duration. With a Cox 6x3 prop, the Cub is capable of nearly vertical performance.

Even though our senior technical editor Gerry Yarrish has been around RC modeling since 1968 (he's got me beat by 2 years!), and he's into giant scale in a big way (no pun intended), these little models have obviously succeeded in charming him, as you can see by his smile. Park and backyard flyers are rapidly finding a place in the hearts of experienced modelers. As another example, my good friend and brilliant giant-scale warbird designer Nick Ziroli also loves these fly-close-to-home models. Here, Gerry is getting ready to launch and test-fly one of the many ready-to-fly models featured in our article on entry-level backyard flyers.

This is our illustrious boss, executive editor Debra Sharp, launching the very scale-like and docile-flying WattAge J-3 Cub. Don't let her demure looks fool you; Debra runs an orderly ship. During our fun small-plane fly-in, the wind picked up a bit too much for these little birds. Cavalierly disregarding weather conditions, as I often do, I started a takeoff with yet another model. Suddenly, Ms. Sharp's voice shattered the peace of that sunny day (and scattered the local chickadee population) as she commanded, "Mr. Chianelli—as your superior, I'm ordering you not to take off that model!" Capt. Kathryn Janeway of the Starship Voyager has nothing on Deb.

***The Mini Laser 3D EP is a precision-cut, all-wood kit. With this little geared, Speed 300-powered aerobat, you can hone your 3D piloting skills at that vacant lot just down the road from your house. I've seen this little performer do its thing, and it does that thing very well, for sure. Read all about it in the premier issue of* Backyard Flyer.**



Megatech's B2 is a brilliant piece of ready-to-fly engineering. It's constructed of very resilient foam and has upper and lower shells that give the main lifting body's center section a hollow radio compartment. It flies using a 600mAh, 7-cell pack (battery and charger included) and electronically mixed elevons. The B2 has good duration and very good flight performance with characteristics typical of a flying wing. It makes an excellent vacation/travel model because the outer wing panels are removable.

The Micro Mustang, designed by Dave Robelen, is the construction article in our premier issue of* Backyard Flyer. *It features an 18-inch wingspan and weighs 66 grams. Forget whatever you've heard about how small models fly. I was totally astounded by the grooviness and stable slow-flight characteristics of this tiny fighter. It even coped with a mild outdoor breeze. You scratch-building types won't want to miss this one.

***AstroFlight Inc.**, 13311 Beach Ave., Marina del Rey, CA 90292; (310) 821-6242; fax (310) 822-6637; www.astroflight.com.*

***Cox Hobbies,** P.O. Box 270, 1295 H St., Penrose, CO 81240; (719) 372-6565; www.estesrockets.com.*

***Hobby Lobby Intl.,** 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948; www.hobby-lobby.com.*

***House of Balsa,** 10101 Yucca Rd., Adelanto, CA 92301; (760) 246 6462; fax (760) 246-8769; www.mag-web.com/rc-modeler/hobnew/.*

***Megatech;** distributed by America's Hobby Center, P.O. Box 32, North Bergen, NJ 07047-0032; www.megatechrc.com.*

***WattAge;** distributed by Global Hobby Distributors, 18480 Bandilier Cir., Fountain Valley, CA 92708; (714) 963-0133; fax (714) 962-6452; www.globalhobby.com.*

Ball field Battle of Britain

Coming up in the next "Backyard Flyer" column is a complete review of Hobby Lobby's Hawker Hurricane, historic adversary of the ME-109 (also offered by Hobby Lobby in backyard-flyer form). This little 40-inch wingspan, 18-ounce foam fighter comes finished just as you see it here, and it and its counterpart, the 109, can both really dogfight their way around your local ball field. Just think—you can reenact the Battle of Britain in your own neighborhood. "*Nev-ah* in the field of human conflicts was so much owed by so many to so few" (Winston Churchill). Both the Hawker and the 109 are fabulous little flyers.

PRODUCT WATCH

Latest product releases

AT *MODEL AIRPLANE NEWS*, we not only tell you what's new, but we also try it out first so we can bring you mini-reviews of the stuff we like best. We're constantly being sent the latest support equipment manufacturers have to offer. If we think a product is good—something special that will make your modeling experiences a little easier or just plain more fun—we'll let you know here. From retracts and hinges to glow starters and videotapes, look for it in "Product Watch."

SKS VIDEO PRODUCTIONS

"Top Gun 2001" & "Joe Nall 2001" Videos

Bring home the action!

Whether you were among the thousands of spectators at this year's Top Gun and Joe Nall events, or you just want to feel as if you were, you'll love these two new videos from SKS Video Productions.

With great aerial footage and detailed shots of some of the best scale planes in the world, "Top Gun 2001" provides exciting and accurate coverage of an event that continues to draw the world's very best builders and pilots to West Palm Beach, FL. Highlights of the 12th Annual Top Gun include: Terry Nitsch's Rafale, Greg Hahn's new P-61, Dave Platt's Magister, Jeff Foley's BF-109, Bob Violett's new F-100, Peter Michel's twin turbine Airbus A330, Nick Ziroli Jr.'s Avenger and 18-year-old Dave Malchione Jr., the youngest competitor ever, with his F-4 Phantom.

One of the best parts of this year's competition was the first-ever inclusion of helicopters. Even though the helis were only judged in static competition, the detailed shots of these scale beauties are some of the most interesting portions of the tape. I can't wait to see what SKS captures next year, when the helis finally take to the sky.

More than 520 registered pilots traveled to the Triple Tree Aerodrome in Triple Tree, SC, to take part in the 19th Annual Joe Nall, and the video is a must-see for anyone interested in giant-scale models. Whether you're looking for close-up images of scale details, or for exciting aerial footage, "Joe Nall 2001" will show you that and more.

The Triple Tree Aerodrome is well known as one of the finest flying fields in the country, and seeing its features will be a treat for viewers of this video. The great footage of the surrounding area and of the pond constructed specifically for floatplanes, contributes to the terrific quality of this video. The full-size air show that features the precision aerobatics of two vintage AT-6 Texans is also a must-see.

The production quality is good, and both videos provide an interesting, overall account of both events. Just about everything you would expect to see is covered, including the Top Gun awards presentation.

Each video runs for approximately two hours. "Top Gun 2001" sells for $24.95, and "Joe Nall 2001" sells for $19.95 (plus S&H). —*Jaime Lagor*

SKS VIDEO PRODUCTIONS, 85 Pine Rd., Abbottstown, PA 17301; (800) 988-6488; outside US (717) 259-7193; fax (717) 259-6379; scott@sksvideo.com; www.sksvideo.com.

PRS TECHNOLOGIES

CoolChem Cyanopoxy System

CA and epoxy in one bottle!

CA is a staple in any modeler's toolbox; it's hard to imagine building a kit without it. That said, it does have some limitations—chief among them is the type of materials it can bond to. What if there was a glue that had the advantages of CA—thin, light, strong, easy to apply and quick to cure—but with the versatility of epoxy? That's exactly what the folks at PRS Technologies set out to create; the result is the CoolChem Cyanopoxy System, and it combines many of the best traits of CA and epoxy into one adhesive.

Have you ever tried to bond metal with conventional CA? If you're lucky, it might hold if the joint isn't stressed, but put any load on it, and you might as well be using grammar-school paste. Not so with CoolChem—the package arrived with several test objects in it, including a pair of lead weights—daring me to test the limits of this glue. Sure enough, after a drop or two of CoolChem and a couple of minutes to cure, the lead weights might as well have been cast as a single piece. I couldn't wrench them apart with pliers!

Not satisfied with the supplied test materials, I set about finding a few challenges of my own. I discovered that CoolChem bonds all sorts of wood—just as you would expect—and plastics are no trouble either. Painted metal? You bet. It also bonds things you wouldn't expect it to—how about a length of rubber tubing? Best of all, it bonds these various materials to each other, and it forms a joint that's light, strong and flexible. Like CA, it doesn't react well to low-grade foam—I tried! It also doesn't grip wax-impregnated cardboard, but those are the only two things I could find that it wouldn't bond to.

The kit comes with one 15g bottle of CoolChem Integrator (adhesive), one 2-ounce spray bottle of Activator (kicker), one 1-ounce bottle of Poly Treatment for bonding nylon, Teflon and poly plastics, a 1-ounce bottle of Debonder for separating joints or cleaning up CoolChem residue and a dozen applicator needles. The entire package retails for just under $50. If you want one adhesive that bonds to pretty much anything, give CoolChem Cyanopoxy a try. —*Matt Boyd*

PRS TECHNOLOGIES, 2862 Northwest Blvd., Columbus, OH 43221; (614) 985-3815; fax (614) 481-8222; www.gowest2.com.

SCHULZE

Blinki-mc3

Battery voltage monitor, glitch recorder and plane finder

This onboard monitoring device is manufactured by the Schulze Elektronik Co. of Germany and distributed in the U.S. by R/C Direct. It is mounted inside your model so it goes along for the ride while it very cleverly monitors the battery voltage of your 4-, 5- and even 6-cell Ni-Cd battery pack. It will also record any interference "glitches" that may occur. And if you happen to land your model in tall grass or some remote place, the unit can emit a loud alarm to help you locate it.

Even with all these functions, the Blinki-mc3 is just 1¾x⅝x7/16 inches and weighs 0.3 ounce (8 grams). One 11-inch-long cable exits from the Blinki and terminates in a JR connector; plug this into an auxiliary channel on your receiver so that you can control the Blinki-mc3 with your transmitter.

A series of eight LEDs on the Blinki-mc3 lights up from green to orange to red. When you turn on the receiver, all eight of them glow for a second or two. Then you will hear 4, 5, or 6 beeps, depending on the size of your battery pack. This indicates that the "smart" circuit has automatically set the Blinki-mc3 to the proper operating voltage.

After the series of beeps, the Blinki settles down to its monitoring job. With a fully charged battery, the no. 8 LED will light up steadily green and will stay lit until the voltage of your pack decreases to 4.8, at which time the no. 7 LED will light up green, and no. 8 will go out. The LEDs then progressively light up green down the line. At about 4.5 volts, the no. 3 LED will light; this one will be orange to inform you that voltage is low and you should consider recharging your battery. The no. 2 LED will also be orange, but it is accompanied by a tone to warn you that the battery is low. Finally, the red (no. 1) LED will light, and the alarm sounds. With both the light and the alarm, there is no way you can mistake the warning to stop flying.

The Blinki-mc3 will also store information during the flight. The data will remain until you turn the receiver power off. After you land, one LED will glow steadily to indicate the current battery voltage. Check the LED while operating the servos to place a load on the batteries. If the unit momentarily registers a lower voltage during the course of the flight, it will indicate this with a flashing LED. This adds an extra measure of safety by letting you know that the voltage you register on the ground may not be consistently maintained in the air—a clear sign that it's time to recharge. Very clever!

A glitch-measuring device can determine whether any interfering signals might have "hit" your receiver while the model was in the air. After the model lands and before you turn the power off, trigger the auxiliary channel that the Blinki-mc3 is connected to. A flashing no. 8 LED indicates that something has been recorded. Down the line, an LED will show how many and how severe the hits were. I tested the effectiveness by hitting the receiver with a signal from the same channel. Since this is a worst-case scenario, the red LED lit, indicating "many hits" or, at least, a major hit.

The final feature of this little device is its plane finder. If you operate that auxiliary channel on your transmitter, you can turn on the very loud alarm to help you locate a model that is out of sight. Turning off the transmitter also triggers the alarm. This can warn you in the pit area that you failed to turn off your receiver.

While operating as a monitor, the Blinki-mc3 draws about 10mA off the battery. While the alarm is sounding, the total current drain is approximately 40mA—not too bad for such a loud alarm. The instructions supplied with the Blinki are somewhat complicated, and the translation from German to English isn't always smooth. But believe me, once you actually try this little monitor, you can figure out most of it by yourself. It is small, light and reliable, and at just $39.99, it offers a lot of function and security for the price. *—Bob Aberle*

SCHULZE ELEKTRONIK CO.; distributed by R/C Direct, 4444 Convoy Ct., San Diego, CA 92111; (888) 291-2111; fax (858) 560-9695; www.rc-direct.com; mail@schulze-elektronik.com; www.schulze-elektronik.com.

SHARK SAW SERIES

Pullsaw

Clean cut

Every modeler needs a good, sharp, handheld saw in his or her toolbox. You often need to cut materials that are simply too tough for the standard no. 11 hobby knife to deal with. What's needed is a sharp razor saw, and there are several to choose from. The Shark Saw Pullsaw is desirable because it is very thin (0.016 inch), and it is longer than the average razor saw. Available at most Sears hardware stores, the Pullsaw is also much sharper than ordinary hobby saws and stays sharper longer.

Originally designed as a professional dowel and dovetail cutting tool, the Pullsaw comes with a 6-inch plastic handle and a 7x2-inch replaceable high-carbon-steel blade. The teeth are precisely ground and will cut though any hobby wood including plywood, spruce and maple, leaving a very fine cut line. Fiberglass and thick plastic are also easy to handle. Because the blade doesn't have a supporting back piece, it can be laid flat against a surface to cut parts flush, and it can make long, straight cuts through sheeting. This comes in really handy when you cut ribs close against the wing spar so you can install a dihedral brace. Of course, the saw also cuts quickly and cleanly through balsa sheet. With a street price of $12.95, this saw is a great find for any modeler who likes to build models from plans and kits.

Give the Shark Saw Pullsaw a try; I know you'll like the way it eats right through the toughest materials. *—Gerry Yarrish*

NAME THAT PLANE

Can you identify this aircraft?

Send your answer to *Model Airplane News*, **Name that Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606 USA.

Congratulations to Donald Solomon of Ogden, UT, for correctly identifying the September 2001 mystery plane as the Douglas B-18A. The B-18A was a modified version of the U.S. Army Air Corps B-18, a twin-engine bomber adaptation of the Douglas DC-3 transport plane. The original contract for 133 B-18s was quickly followed by a second contract for 237 B-18As that featured powerful, 1,000 horsepower Wright R-1820-53 engines; longer, more heavily glazed, shark-type noses; and power-operated dorsal turrets. The B-18A had a wingspan of 89 feet, 6 inches, was 57 feet, 10 inches long and had a maximum level speed of 215mph. Most B-18As were later converted into B-18Bs, which carried radar in the nose and submarine-detection equipment in the tail cone. ✈

The winner will be chosen, four weeks following publication, from correct answers received (delivered by U.S. mail) and will be awarded a free, one-year subscription to *Model Airplane News*. If already a subscriber, the winner will be given a free, one-year subscription extension.

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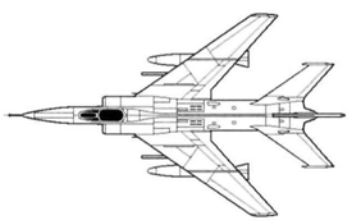

MODEL AIRPLANE NEWS (ISSN 0026-7295, USPS 533-470) is published monthly by Air Age Inc., 100 East Ridge, Ridgefield, CT 06877-4606 USA. Periodical postage permit paid at Ridgefield, CT, and additional mailing offices.

SUBSCRIPTIONS. U.S. and Canada, call (800) 827-0323; elsewhere, call (815) 734-1116. Or set your Web browser to www.airage.com/subscribe.html. **U.S.**: $34.95 (one year), $55.95 (two years). **Canada**: $49.95 (one year), $87.95 (two years), inc. GST, reg. no. 13075 4872 RT. **Elsewhere**: $48.95 (one year), $83.95 (two years). Prepayment required; Visa, MC and AmEx accepted.

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Advertisers

More than 4 hours in flight!

Standing (left to right): Bill Maserang, Mary Ann Wilder, Bob Wilder, Bud Tenny, Ernie Harwood, Greg Judy and Jim Clem. Kneeling (left to right): Bill Wilder, his son Everett and Ron Hanna.

Like many modelers, I'm enticed by a challenge, and I could not resist this one. Designing, testing and building a new concept in model aviation appeals to me. This quest began when I first read about AMA event no. 627, "Indoor R/C Electric Duration."

The author and his record-breaking model.

On my earlier record flight of 2 hours and 34 minutes, I used rechargeable batteries. Sometime after I set that official record flight, I made an unofficial test flight using some non-rechargeable, one-shot lithium batteries. That flight lasted 4 hours, 11 minutes.

In preparation for my attempt to establish a new official record, I changed some of my equipment, such as the receiver and electronic speed control (ESC); I also switched the motor and gearbox. On the test stand in my workshop, I performed a few test runs and decided that it would be necessary to use only three lithium batteries for my official flight. I changed the standard 600mAh Ni-Cd batteries in the transmitter to 1300mAh NiMH batteries.

One obstacle in my path was finding a good place to fly. My wife, Mary Ann, suggested that I contact the engineering department of the University of Texas at Arlington (we have two sons who are UTA graduates).

The staff of the college's engineering department received us enthusiastically, particularly when we told them that the current record had been set by Dr. Tom Avedisian at Cornell University! There's nothing more invigorating than the spirit of collegiate competition.

We applied to the AMA for a record trial sanction, and Ernie Harwood agreed to serve as the contest director, with Greg Judy, Bill Maserang and Ron Hanna stepping in as official timers. On Saturday, June 30, 2001, we arrived at the UTA Activity Building at 9 a.m. sharp and were airborne by 9:14.

The room we flew in was about 150 feet square with about a 30-foot ascent to the rafters. The airplane was airborne only briefly, however, when it became apparent that the air conditioning was blowing up a storm! The model was difficult to control with it on, so it was turned off. Things settled down then, and I tried to relax for a while.

This model had only rudder control for direction and motor speed control for altitude. I learned from past experience that I could have good control of the model just by using the trim-adjust levers on my transmitter. Only during the turbulent flight time with the A/C on was it necessary to use the transmitter-control sticks.

SPECIFICATIONS

INDOOR R/C ELECTRIC ENDURANCE AMA RECORD TRIAL

Date: June 30, 2001
Place: University of Texas at Arlington

MODEL SIZE
Wingspan: 38 in.
Area: 250 sq. in.
Weight: 114g

POWER
Motor: WES-Technik 1717
Gearbox: WES-Technik 11.8:1
Prop: WES-Technik 10-in. carbon
Battery: Varta lithium CR 123-A, 3 volts, 1300mAh (3 cells, 9 volts)

RADIO AND EQUIPMENT
Receiver: GWS
Servo: WES-Technik
ESC: Castle Creations Pixie 7

During the official flight at UTA, my good friends Bud Tenny and Jim Clem came by to cheer me on and offer words of encouragement. Two UTA engineering faculty members also stopped by—Drs. George Dulikravich and Don Wilson. As it turned out, Dr. Dulikravich and Dr. Tom Avedisian know each other. Small world!

After each hour of flight time, someone photographed me. After three hours, I had a big smile on my face, as I was on my way to establishing a new record. The throttle setting on my transmitter indicated that I still had a lot of battery power left, or, as the expression goes, "... some gas still left in the tank." At the four-hour mark, I could tell the battery was near the end. At four hours, 17 minutes and 57 seconds, the model touched down with the motor still running.

The question most people ask when they hear that I flew nonstop for over four hours is, "How did you do that without a potty break?" Simple. I bring kitty litter.

Occasionally, I get a more serious question such as, "Can you make your model fly inverted or do an outside loop?" I reply that it is all I can do to keep it from hitting the walls or rafters for four-plus hours.

Actually, it felt good to be in the same class as a modeler like Tom Avedisian!